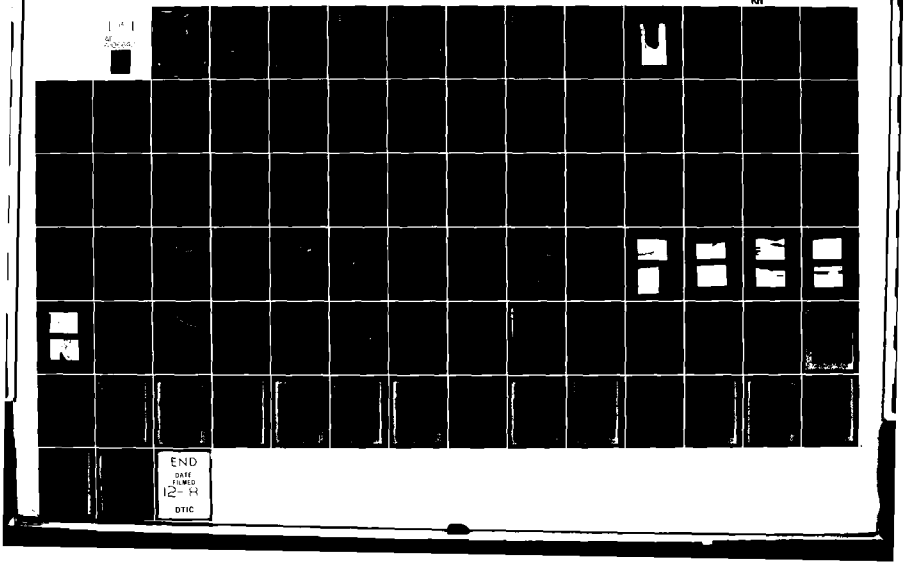
AD-A106 642 PRC CONSOER TOWNSEND INC ST LOUIS MO F/G 13/13
NATIONAL DAM SAFETY PROGRAM. MO NO NAME 314 DAM, DIRKEMEIER LAK--ETC(U)
SEP 79 W G SHIFRIN DACW43-79-C-0075
UNCLASSIFIED NL



LEVEL II

MISSISSIPPI-KASKASKIA-ST. LOUIS BASIN

AD A106642

MO. NONAME 314 DAM
WARREN COUNTY, MISSOURI
MO 30507

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

United States Army
Corps of Engineers
Serving the Army
Serving the Nation

St. Louis District

PREPARED BY: U. S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

SEPTEMBER, 1979

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. ADA106642 / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Phase I Dam Inspection Report National Dam Safety Program Dirkemeier Lake Dam - MONONAME 314 (MO 30507) Warren County, Missouri	5. TYPE OF REPORT & PERIOD COVERED Final Report / 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Consoer, Townsend and Associates, Ltd.	8. CONTRACT OR GRANT NUMBER(s) DACW43-79-C-0075
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101	12. REPORT DATE September 1979 / 13. NUMBER OF PAGES Approximately 70
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report) UNCLASSIFIED / 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

National Dam Safety Program. No Name 314 Dam, [redacted] Dirkemeier Lake Dam (MO 30507), Mississippi - Kaskaskia - St. Louis Basin, Warren County, Missouri. Phase I Inspection Program.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety, Lake, Dam Inspection, Private Dams

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

411553

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

INSTRUCTIONS FOR PREPARATION OF REPORT DOCUMENTATION PAGE

RESPONSIBILITY. The controlling DoD office will be responsible for completion of the Report Documentation Page, DD Form 1473, in all technical reports prepared by or for DoD organizations.

CLASSIFICATION. Since this Report Documentation Page, DD Form 1473, is used in preparing announcements, bibliographies, and data banks, it should be unclassified if possible. If a classification is required, identify the classified items on the page by the appropriate symbol.

COMPLETION GUIDE

General. Make Blocks 1, 4, 5, 6, 7, 11, 13, 15, and 16 agree with the corresponding information on the report cover. Leave Blocks 2 and 3 blank.

Block 1. Report Number. Enter the unique alphanumeric report number shown on the cover.

Block 2. Government Accession No. Leave Blank. This space is for use by the Defense Documentation Center.

Block 3. Recipient's Catalog Number. Leave blank. This space is for the use of the report recipient to assist in future retrieval of the document.

Block 4. Title and Subtitle. Enter the title in all capital letters exactly as it appears on the publication. Titles should be unclassified whenever possible. Write out the English equivalent for Greek letters and mathematical symbols in the title *(see "Abstracting Scientific and Technical Reports of Defense-sponsored RDT/E," AD-667 000)*. If the report has a subtitle, this subtitle should follow the main title, be separated by a comma or semicolon if appropriate, and be initially capitalized. If a publication has a title in a foreign language, translate the title into English and follow the English translation with the title in the original language. Make every effort to simplify the title before publication.

Block 5. Type of Report and Period Covered. Indicate here whether report is interim, final, etc., and, if applicable, inclusive dates of period covered, such as the life of a contract covered in a final contractor report.

Block 6. Performing Organization Report Number. Only numbers other than the official report number shown in Block 1, such as series numbers for in-house reports or a contractor/grantee number assigned by him, will be placed in this space. If no such numbers are used, leave this space blank.

Block 7. Author*(s)*. Include corresponding information from the report cover. Give the name*(s)* of the author*(s)* in conventional order *(for example, John R. Doe or, if author prefers, J. Robert Doe)*. In addition, list the affiliation of an author if it differs from that of the performing organization.

Block 8. Contract or Grant Number*(s)*. For a contractor or grantee report, enter the complete contract or grant number*(s)* under which the work reported was accomplished. Leave blank in in-house reports.

Block 9. Performing Organization Name and Address. For in-house reports enter the name and address, including office symbol, of the performing activity. For contractor or grantee reports enter the name and address of the contractor or grantee who prepared the report and identify the appropriate corporate division, school, laboratory, etc., of the author. List city, state, and ZIP Code.

Block 10. Program Element, Project, Task Area, and Work Unit Numbers. Enter here the number code from the applicable Department of Defense form, such as the DD Form 1498, "Research and Technology Work Unit Summary" or the DD Form 1634, "Research and Development Planning Summary," which identifies the program element, project, task area, and work unit or equivalent under which the work was authorized.

Block 11. Controlling Office Name and Address. Enter the full, official name and address, including office symbol, of the controlling office. *(Equates to funding/sponsoring agency. For definition see DoD Directive 5200.20, "Distribution Statements on Technical Documents.")*

Block 12. Report Date. Enter here the day, month, and year or month and year as shown on the cover.

Block 13. Number of Pages. Enter the total number of pages.

Block 14. Monitoring Agency Name and Address *(if different from Controlling Office)*. For use when the controlling or funding office does not directly administer a project, contract, or grant, but delegates the administrative responsibility to another organization.

Blocks 15 & 15a. Security Classification of the Report: Declassification/Downgrading Schedule of the Report. Enter in 15 the highest classification of the report. If appropriate, enter in 15a the declassification/downgrading schedule of the report, using the abbreviations for declassification/downgrading schedules listed in paragraph 4-207 of DoD 5200.1-R.

Block 16. Distribution Statement of the Report. Insert here the applicable distribution statement of the report from DoD Directive 5200.20, "Distribution Statements on Technical Documents."

Block 17. Distribution Statement *(of the abstract entered in Block 20, if different from the distribution statement of the report)*. Insert here the applicable distribution statement of the abstract from DoD Directive 5200.20, "Distribution Statements on Technical Documents."

Block 18. Supplementary Notes. Enter information not included elsewhere but useful, such as: Prepared in cooperation with . . . Translation of *(or by)* . . . Presented at conference of . . . To be published in . . .

Block 19. Key Words. Select terms or short phrases that identify the principal subjects covered in the report, and are sufficiently specific and precise to be used as index entries for cataloging, conforming to standard terminology. The DoD "Thesaurus of Engineering and Scientific Terms" *(TEST)*, AD-672 000, can be helpful.

Block 20. Abstract. The abstract should be a brief *(not to exceed 200 words)* factual summary of the most significant information contained in the report. If possible, the abstract of a classified report should be unclassified and the abstract to an unclassified report should consist of publicly- releasable information. If the report contains a significant bibliography or literature survey, mention it here. For information on preparing abstracts see "Abstracting Scientific and Technical Reports of Defense-Sponsored RDT&E," AD-667 000.

☆ U.S. G.P.O. 1980-665-141/1299

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 NORTH 12TH STREET
ST. LOUIS, MISSOURI 63101

IN REPLY REFER TO

SUBJECT: Mo. Noname 314 Dam (Mo. 30507) Phase I Inspection Report

This report presents the results of field inspection and evaluation of the Mo. Noname 314 Dam (Mo. 30507).

It was prepared under the National Program of Inspection of Non-Federal Dams.

This dam has been classified as unsafe, non-emergency by the St. Louis District as a result of the application of the following criteria:

1) Spillway will not pass 50 percent of the Probable Maximum Flood
2) Overtopping could result in dam failure
3) Dam failure significantly increases the hazard to loss of life downstream

SUBMITTED BY: SIGNED
Chief, Engineering Division
18 SEP 1979
Date

APPROVED BY: SIGNED
Colonel, CE, District Engineer
18 SEP 1979
Date

MONONAME 314 DAM
WARREN COUNTY, MISSOURI

MISSOURI INVENTORY NO. 30507

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY
CONSOER, TOWNSEND AND ASSOCIATES LTD.
ST. LOUIS, MISSOURI
AND
ENGINEERING CONSULTANTS, INC.
ENGLEWOOD, COLORADO
A JOINT VENTURE

UNDER DIRECTION OF
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
FOR
GOVERNOR OF MISSOURI

SEPTEMBER 1979

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Mononame 314 Dam, Missouri Inv. No. 30507
State Located: Missouri
County Located: Warren
Stream: An unnamed tributary of Lost Creek
Date of Inspection: May 19, 1979

Assessment of General Condition

Mononame 314 Dam was inspected by the engineering firms of Consoer, Townsend and Associates, Ltd. and Engineering Consultants, Inc. (A Joint Venture) of St. Louis, Missouri using the "Recommended Guidelines for Safety Inspection of Dams". These guidelines were developed by the Chief of Engineers, U.S. Army, Washington, D.C., with the help of Federal and State agencies, professional engineering organizations, and private engineers. The resulting guidelines are considered to represent a consensus of the engineering profession.

Based on the criteria in the guidelines, the dam is in the high hazard potential classification, which means that loss of life and appreciable property loss could occur in the event of failure of the dam. Six houses, three buildings and one road crossing may be subjected to flooding, with possible damage and/or destruction, and possible loss of life. Mononame 314 Dam is in the

small size classification since it is less than 40 feet high and impounds less than 1,000 acre-feet of water.

Our inspection and evaluation indicates that the spillway of Mononame 314 Dam does not meet the criteria set forth in the guidelines for a dam having the above size and hazard potential. Mononame 314 Dam, being a small size dam with a high hazard potential, is required by the guidelines to pass from one-half of the Probable Maximumm Flood to the Probable Maximum Flood without overtopping. Since there is high hazard potential downstream of the dam, the appropriate spillway design flood for this dam is the Probable Maximum Flood. Based on available data it was determined that the reservoir/spillway system can accommodate 31 percent of the Probable Maximum Flood without overtopping the dam. Our evaluation indicates that the reservoir/spillway system will accommodate the 100-year flood without overtopping.

The Probable Maximum Flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in the region. The 100-year flood is defined as the flood having one percent chance of being equalled or exceeded during any given year.

Other deficiencies noted by the inspection team were the wave erosion on the upstream embankment slope, poor condition of the concrete slab of the spillway, trees and large brush on the downstream embankment slope, a need for periodic inspection by a qualified engineer and a lack of maintenance schedule. The lack of stability and seepage analyses on record is also a deficiency that should be corrected.

It is recommended that the owner take action to correct or control the deficiencies described above.

Walter G. Shifrin, P.E.

STATE OF MISSOURI
WALTER
G SHIFRIN
NUMBER
E-8834
REGISTERED PROFESSIONAL ENGINEER

Overview of Mononame 314 Dam

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

MONONAME 314, I. D. No. 30507

TABLE OF CONTENTS

Sect. No.	Title	Page
SECTION 1	PROJECT INFOMRATION	1
	1.1 General	1
	1.2 Description of Project	3
	1.3 Pertinent Data	7
SECTION 2	ENGINEERING DATA	10
	2.1 Design	10
	2.2 Construction	10
	2.3 Operation	10
	2.4 Evaluation	10
SECTION 3	VISUAL INSPECTION	12
	3.1 Findings	12
	3.2 Evaluation	16

TABLE OF CONTENTS

(Continued)

Sect. No.	Title	Page
SECTION 4	OPERATION PROCEDURES	18
	4.1 Procedures	18
	4.2 Maintenance of Dam	18
	4.3 Maintenance of Operating Facilities	18
	4.4 Description of Any Warning System in Effect	19
	4.5 Evaluation	19
SECTION 5	HYDRAULIC/HYDROLOGIC	20
	5.1 Evaluation of Features	20
SECTION 6	STRUCTURAL STABILITY.	24
	6.1 Evaluation of Structural Stability	24
SECTION 7	ASSESSMENT/REMEDIAL MEASURES . . .	26
	7.1 Dam Assessment	26
	7.2 Remedial Measures	28

TABLE OF CONTENTS

(Continued)

LIST OF PLATES

	Plate No.
LOCATION MAP	1
PLAN AND ELEVATION OF DAM	2
GEOLOGIC MAPS	3-4
SEISMIC ZONE MAP	5

APPENDICES

APPENDIX A - PHOTOGRAPHS

APPENDIX B - HYDROLOGIC COMPUTATIONS

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

MONONAME 314 DAM, Missouri Inv. No. 30507

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority

The Dam Inspection Act, Public Law 92-367 of August, 1972, authorizes the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspections. Inspection for Mononame 314 Dam was carried out under Contract DACW 43-79-C-0075 to the Department of the Army, St. Louis District, Corps of Engineers, by the engineering firms of Consoer, Townsend & Associates Ltd., and Engineering Consultants, Inc. (A Joint Venture), of St. Louis, Missouri.

b. Purpose of Inspection

The visual inspection of Mononame 314 Dam was made on May 19, 1979. The purpose of the inspection was to make a general assessment as to the structural integrity and operational adequacy of the dam embankment and its appurtenant structures.

c. Scope of Report

This report summarizes available pertinent data relating to the project; presents a summary of visual observations made during the field inspection; presents an assessment of hydrologic and hydraulic conditions at the site; presents an assessment as to the structural adequacy of the various project features; and assesses the general condition of the dam with respect to safety.

Subsurface investigations, laboratory testing, and detailed analyses were not within the scope of this study. The conclusions drawn herein, therefore, are based on the presence of, or absence of, obvious signs of distress. No warranty as to the absolute safety of the project features is implied by the conclusions presented in this report.

It should be noted that reference in this report to left or right abutments is as viewed looking downstream. Where left abutment or left side of the dam is used in this report, this also refers to north abutment or side, and right to the south abutment or side.

d. Evaluation Criteria

Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in "Recommended Guidelines for Safety Inspection of Dams", Appendix D. These guidelines were developed with the help of several Federal agencies and many State agencies, professional engineering organizations, and private engineers.

1.2 Description of the Project

a. Description of Dam and Appurtenances

It should be noted that design drawings are not available for the dam or appurtenant structures. The following description is based exclusively on observations and measurements made during the visual inspection.

The dam embankment is a compacted earthfill structure. The crest width is 12 feet, and the crest length is 415 feet. The crest elevation varies from 832.7 to 833.7 feet above MSL, and the maximum height of the embankment was measured to be 32.5 feet.

The downstream slope of the embankment was measured as 1V to 2.25H. Because of the high water level in the reservoir the upstream slope was difficult to measure but appeared to be close to 1V to 3H. No riprap was placed on the upstream slope. The entire exposed embankment has a grass cover.

The damsite is situated on the border between the Dissected Till Plain Section of Central Lowlands Physiographic Province which extends to the north and the Ozark Plateau Province which extends to the south. Although the area in which the dam and reservoir are located was glaciated during Pleistocene time, the till and loess which characterize the uplands of the Till Plains have been largely removed by erosion since the end of the Pleistocene. The area is characterized by wooded hills which have gentle to steep slopes.

The bedrock geology of the area as shown on the Geologic Map of Missouri (1979) typically consists of gently northeastwardly dipping (ca. 30-50 feet/mile) sediments of Palezoic age. To the north of Warren County these beds are often capped by young (Pleistocene) deposits of glacial drift and wind blown loess. In the southern areas of the county the bedrock is generally covered by residual soil, colluvium, or alluvium. The rocks underlying the area are predominately carbonates (limestones and dolomites) although beds of sandstone and shale are not infrequent.

The bedrock of Warren County contains minor folding. The largest known geologic structure in the area is a gentle anticline centered about 2 1/2 miles northwesterly of the town of Warrenton. It is not known if the beds beneath the dam are affected by this fold which is three miles away from the damsite.

The spillway for Mononame 314 Dam is an open channel depression with a concrete slab located perpendicular to and just beyond the right abutment of the dam. The concrete slab is V-shaped and has a length of 35 feet, 6 inches and a width of 16 feet. The elevation difference from the invert of the concrete slab to the low point on the dam crest is 2 feet 8 inches. The upstream edge of the concrete spillway slab is provided with a 12 inch high wire mesh trashrack. Discharges through the spillway will flow to the south away from the embankment.

There is no low level drain pipe or outlet works at the dam.

b. Location

The dam is located near the head of unnamed intermittant tributary of Lost Creek. The stream flows about one-quarter of a mile from the dam before it flows into Lost Creek. From the confluence Lost Creek runs southerly for about 3 miles then southeasterly for about 11 miles where it flows into the Missouri River near the village of Gore just upstream of Mile 90. The major access to the damsite from Warrenton, Missouri is west on the Interstate Highway No. 70 frontage road approximately 4 miles to a gravel road heading south, thence south on this road 1/4 mile to a private road to the east. The damsite is located at the end of the private road, approximately 1,000 feet from the beginning of the road. The dam and reservoir are shown in the Warrenton Quadrangle Sheet (7.5 minute series) in Section 23, Township 47 North, Range 3 West.

c. Size Classification

According to the "Recommended Guidelines for Safety Inspection of Dams", by the U.S. Department of the Army, Office of the Chief Engineer, the dam is classified in the dam size category as being "Small" since its storage is less than 1,000 acre-feet. The dam is also classified as "Small" in dam height category because its height is less than 40 feet. The overall size classification is, accordingly, "Small" in size.

d. Hazard Classification

The dam has been classified as having "High" hazard potential in the National Inventory of Dams, on the basis that in the event of failure of the dam or its appurtenances, excessive damage could occur to downstream property, together

with the possibility of the loss of life. Our findings concur with the classification. Within about four miles downstream from the dam are six houses, three buildings and one road crossing.

e. Ownership

The dam and lake are owned by a private owner, Mr. Herbert Birkemeier. The mailing address is Herbert Birkemeier, 1448 St. Louis Street, Florissant, Missouri, 63133.

f. Purpose of Dam

The purpose of the dam is to impound water for recreational use as a private lake.

g. Design and Construction History

Mononame 314 Dam was designed in 1969 by Mr. Bob Lewis of Warrenton, MO. Efforts to obtain plans or documents concerning the design phase have been futile. The dam was reportedly built by Russell Bollinger (deceased) of Wright City, MO. According to the present owner, the existing spillway slab was placed about seven years ago.

h. Normal Operational Procedures

Mononame 314 Dam is used to impound water for recreational use. There are no facilities other than the spillway to control water level in the lake. The water level below the spillway crest is controlled by rainfall, runoff and evaporation. There are no specific operational procedures for this lake and dam.

1.3 Pertinent Data

a. Drainage Area (square miles):	0.20
b. Discharge at Damsite	
Estimated experienced maximum flood (cfs):	30
Estimated ungated spillway capacity at top of dam elevation (cfs):	315
c. Elevation (Feet above MSL)	
Top of dam:	832.7
Spillway crest:	
Service Spillway	830.0 (Assumed)*
Emergency Spillway	NA
Normal Pool	830.0
Maximum Pool (During occurence of PMF, assuming intact dam)	834.13
d. Reservoir	
Length of maximum pool: at top of dam elevation	1740
e. Storage (Acre-Feet)	
Top of dam:	134
Spillway crest:	103
Normal Pool:	103
Maximum Pool(During occurence of PMF, assuming intact dam)	154

f. Reservoir Surface (Acres)

Top of dam:	12.2
Spillway crest:	
Service Spillway	11.0
Emergency Spillway	NA
Normal Pool:	11.0
Maximum Pool(During occurence of PMF, assuming intact dam)	12.9

g. Dam

Type:	Rolled Earthfill
Length:	415 feet
Structural Height:	32.5 feet
Hydraulic Height:	32.5 feet
Top width:	12.0 feet
Side slopes:	
Downstream	1V to 2.25H
Upstream	Unknown
Zoning:	Unknown
Impervious core:	Unknown
Cutoff:	Unknown
Grout curtain:	Unknown

h. Diversion and Regulating Tunnel None

i. Spillway

Type:

Service Spillway	Uncontrolled, Concrete Channel
Emergency Spillway	NA

Length of weir:

Service Spillway	V-shaped concrete channel having a top width of 35.5 feet for the concrete section and total top width at the top of dam elevation is about 90.5 feet
Emergency Spillway	NA

Crest Elevation (feet above MSL):

Service Spillway	830 (Assumed)*
Emergency Spillway	NA

j. Regulating Outlets None

* Relative elevations of the dam crest and the spillway crest were measured. The elevation w.r.t. MSL was assumed from the U.S.G.S. quad. sheet.

SECTION 2 : ENGINEERING DATA

2.1 Design

Design drawings or calculations are not available for the dam. It is doubtful if any plans exist for the dam.

2.2 Construction

No construction records or data are available for the dam and appurtenant structures.

2.3 Operation

No operational data are available for the dam.

2.4 Evaluation

a. Availability

No design drawings, design computations, construction data, or operation data are available.

In addition, no pertinent data were available for review of hydrology, spillway capacity, flood routing through the reservoir, outlet capacity, slope stability, seepage analysis, or foundation conditions.

b. Adequacy

The lack of engineering data did not allow for a definitive review and evaluation. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing and evaluating design, operation and construction data, but is based primarily on visual inspection, past performance history, and sound engineering judgment.

Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions (including earthquake loads) and made a matter of record.

c. Validity

No valid engineering data are available.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

A visual inspection of the Mononame 314 Dam was made on May 19, 1979. The following persons were present during the inspection:

Name	Affiliation	Disciplines
Dr. M.A. Samad	Engineering Consultants, Inc.	Project Engineer, Hydraulics and Hydrology
Jon Diebel	Engineering Consultants, Inc.	Structural and Mechanical
Peter Strauss	Engineering Consultants, Inc.	Soils
Peter Howard	Engineering Consultants, Inc.	Geology
Kevin Blume	Consoer, Townsend & Assoc., Ltd.	Civil and Structural

Specific observations are discussed below.

b. Dam

The crest and downstream slope of the dam have a heavy grass cover which adequately protects the embankment material. A few trees were observed growing in the downstream slope.

The upstream slope has no riprap and has undergone some erosion from wave action. The erosion was slightly stronger in the central portion of the dam as seen by the sinuous trace of the upstream slope shoreline. The resulting scarp near the crest is from 1" to 2 feet high.

A continuous crack about 1/4-inch wide with no offset was seen in a tire track on the crest of the dam. This appears to be a shrinkage crack across the length of the embankment. There are many tributary shrinkage cracks emanating from this long crack. The main crack in the tire tracks does not extend onto the abutments.

No evidence of seepage or leakage either through or below the downstream toe was seen. Rodent activity was also not observed on the embankment.

By visual inspection, the central portion of the dam seems to have settled somewhat more than the abutment sections.

No signs of past or present instability were seen on the embankment or in the foundation at any location.

No outcrops of bedrock were observed in the vicinity of the dam. Based on knowledge of the geology of the area, well logs obtained from the Missouri Geological Survey and Geologic Map of Missouri, (1978), the bedrock under the site is thought to be Burlington Limestone (Osagean Series, Mississippian). The bedrock is mantled in the area by residual and sometimes underlying glacial drift or loess and glacial drift. (Soil Conservation Service, Soil Survey of Montgomery and Warren County, Missouri, 1978).

The Burlington Limestone dips northeasterly at about 30 feet per mile.

It is not known if the dam is founded on bedrock or not. However, if it is on bedrock, the Burlington Limestone would provide an adequate foundation for a dam of this size.

If the dam is not resting on bedrock, then the central part of the dam is resting on bottom land, soils and the abutments are tied to upslope soils.

It is not known what was placed in the dam embankment, but because of its proximity and ready availability, it is probable that the fill is to a great extent borrowed from up slope soils.

According to the soil survey, the soils forming the bottom land in the vicinity of the dam consist of silt (ML), very cherty clay (BC), and clay (CL). Upslope of the bottom land the soils are silty clay (CL-ML,CL) and clay (CL).

c. Appurtenant Structures

(1) Spillway

The concrete pad for the overflow spillway was not constructed with a vertical cutoff wall on either the upstream or downstream edge of the slab. As a result, seepage is occurring under the slab, exiting into the spillway discharge channel downstream of the pad. This seepage is causing settlement of the materials under the slab, resulting in a small longitudinal crack forming near the center of the pad. The trashrack on the upstream edge of the pad is unstable, but does not affect the ability of the spillway to pass discharges. Heavy grass is growing upstream of the concrete pad in the reservoir.

The spillway discharge channel is a naturally eroded channel which carries discharges to the south away from the dam. The channel has eroded to bedrock, and is a trapezoidal section with a typical bottom width of 5 feet, a top width of 10 feet, and a depth of 6 feet. The channel meanders downstream of the concrete pad, ultimately discharging into the downstream stream channel.

(2) Outlet Works

There is no operating low level drain pipe of the outlet works at the damsite.

d. Reservoir Area

The water surface elevation was 830.0 feet above MSL at the time of inspection. The reservoir rim is gently sloping with trees and woods near the shore. No evidence of any instability was observed.

e. Downstream Channel

The downstream channel which carries spillway discharges is a naturally eroded channel. The channel has a trapezoidal section having a typical bottom width of 5 feet, and a top width of 10 feet and a depth of 6 feet. The channel meanders downstream from the spillway and discharges into a well defined natural stream. No major obstacles or debris were observed on the channel.

3.2 Evaluation

The following items were observed which could affect the safety of the dam, or which will require maintenance within a reasonable period of time.

1. Some erosion and sloughing of the embankment materials in the upstream embankment slope.

2. Some trees growing on the downstream embankment slope.

3. Settlement of the central portion of the dam embankment.

4. Settlement of material under the concrete spillway slab and resulting cracking of the slab.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

Mononame 314 Dam lake is used for recreational purposes. There are no facilities at this time which require any specific procedure for operation. Water level in the reservoir is controlled by rainfall, runoff, evaporation, and the spillway elevation.

4.2 Maintenance of Dam

The dam is, at this time, maintained by the owner, Mr. Birkemeier. Corrective and remedial measures are performed as they are needed. The dam crest and slopes are kept fairly clear of tall grasses and brush, however, a few small saplings and bushes exist that should be cut at this time. According to the owner, the existing spillway slab was added about seven years ago. The spillway slab has a crack thru the mid-point which was probably caused by seepage under the slab. On the day of the inspection, a small amount of water was flowing under the spillway slab.

The spillway discharge channel is an earth channel and is eroding rather rapidly.

4.3 Maintenance of Operating Facilities

There are no operating facilities at the dam.

4.4 Description of Any Warning System in Effect

The inspection team is not aware of any existing warning system in effect.

4.5 Evaluation

The operation and maintenance for this dam, with exception of the items listed for corrective action, seems to be fairly adequate.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design

The watershed area of Mononame 314 Dam upstream from the dam axis consists of approximately 130 acres. Most of the watershed area is wooded and covered with grass. Land gradients in the watershed average roughly 2 percent. Mononame 314 Dam is located on an unnamed tributary of Lost Creek. The reservoir is about 1200 feet upstream from the confluence of the unnamed tributary and Lost Creek. At its longest arm the watershed is approximately 1 mile long. A drainage map showing the watershed area is presented as Plate 1 in Appendix B.

Evaluation of the hydraulic and hydrologic features of Mononame 314 Dam was based on criteria set forth in the Corps of Engineers' "Recommended Guidelines for Safety Inspection of Dams", and additional guidance provided by the St. Louis District of the Corps of Engineers. The Probable Maximum Flood (PMF) was calculated from the Probable Maximum Precipitation (PMP) using the methods outlined in the U.S. Weather Bureau Publication, Hydrometeorological Report No. 33. The probable maximum storm duration was set at 24 hours, and storm rainfall distribution was based on criteria given in EM 1110-2-1411 (Standard Project Storm). The SCS method was used for deriving the unit hydrograph, utilizing the Corps of Engineers' computer program HEC-1 (Dam Safety Version). The unit hydrograph parameters are presented in Appendix B. The

SCS method was also used for determining loss rate. The hydrologic soil group of the watershed was determined by use of published soil maps. The hydrologic soil group of the watershed and the SCS curve number are also presented in Appendix B. The curve number, unit hydrograph parameters, PMP index rainfall and the percentages for various durations were directly input to the HEC-1 (Dam Safety Version) computer program to obtain the PMF hydrograph. The computed peak discharges of the PMF and one-half of the PMF are 2,158 cfs and 1,079 cfs respectively.

Both the PMF and one-half of the PMF inflow hydrographs were routed through the reservoir by the Modified Puls Method also utilizing the HEC-1 (Dam Safety Version) computer program. The reservoir was assumed at the spillway crest level at the start of routing computation. The peak outflow discharges for the PMF and one-half of the PMF are 1,894 and 735 cfs respectively. Both the PMF and one-half of the PMF, when routed through the reservoir result in overtopping of the dam.

The stage-outflow relation for the spillway was prepared from field notes, and sketches, prepared during the field inspection. The reservoir stage-capacity data was based on the U.S.G.S. Warrenton, MO. Quandrangle topographic map (7.5 minute series). The spillway and overtop rating curve and the reservoir capacity curve are presented in Plates 2 & 3 respectively in Appendix B.

From the standpoint of dam safety, the hydrologic design of a dam aims at avoiding overtopping. Overtopping is especially dangerous for an earth dam because the downrush of waters over the crest will erode the dam embankment and release all the stored water suddenly into the downstream

floodplain. The safe hydrologic design of a dam requires a spillway size that can handle a very large and exceedingly rare flood without overtopping.

The Corps of Engineers designs its dams to safely pass the Probable Maximum Flood that is estimated could be generated from the upstream watershed. This is the generally accepted criterion for major dams throughout the world, and is the standard for dam safety where overtopping would pose any threat to human life. According to the Corps criteria, the hydrologic requirement for safety for this dam is the capability to pass from one-half Probable Maximum Flood to the Probable Maximum Flood without overtopping.

b. Experience Data

No records of reservoir stage or spillway discharge are maintained for this site. However, according to representative of the owner, the maximum reservoir level was about 6 inches above the spillway.

c. Visual Observations

Observations made of the spillway during the visual inspection are discussed in Section 3.1c(1) and evaluated in Section 3.2.

d. Overtopping Potential

As indicated in Section 5.1-a, both the Probable Maximum Flood and one-half of the Probable Maximum Flood, when routed through the reservoir, resulted in overtopping of the dam. The peak outflow discharges for the PMF and one-half of the PMF are 1,894 and 735 cfs respectively. The PMF over-

topped the dam crest by 1.43 feet and one-half of the PMF overtopped the dam crest by 0.56 feet, respectively. The total duration of embankment overflow is 4.25 hours during the PMF, and 0.92 hour during one-half of the PMF. The spillway for Mononame 314 Dam is capable of passing a flood equal to approximately 31 percent of the PMF just before overtopping the dam.

The computed one percent chance flood using 100-year, 24 hour rainfall data, was routed through the reservoir, and is given in the last section in Appendix B. The routing results indicate the spillway/reservoir system will accommodate the 100-year flood without overtopping the dam.

The failure of the dam could cause extensive damage to the property downstream of the dam and possible loss of life. Within about 4 miles downstream from the dam are six dwellings, three buildings and one road crossing.

It is not known what was placed in the dam embankment, but because of its proximity and ready availability, it is probable that the fill is to a great extent borrowed from upslope soils in the vicinity of the damsite. According to the Soil Survey of Montgomery and Warren Counties Missouri, 1978, the soils forming the bottom land in the vicinity of the dam consist of silt (ML), very cherty clay (BC), and clay (CL). Upslope of the bottom land the soils are silty clay (CL-ML,CL) and clay (CL). If the material in the dam is in the silty side (ML), it would probably be more susceptible to erosion and failure during overtopping than if it is in the clayey side (CL).

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

There were no signs of distress observed on the embankment or foundation with the exception of the wave eroded scarp on the upstream slope near the crest. This is not serious at this time, but the condition should be watched, and repairs made as required. The crack observed running along the crest of the dam is believed to be a shrinkage crack. The apparent greater settlement in the central portion of the embankment is not believed to affect the structural stability of the embankment.

The structural condition of the spillway is unstable. The concrete slab was not constructed with a cut-off wall either at the upstream or downstream end of the slab. This has allowed seepage to flow directly under the slab, which has caused loss of fill material due to piping and subsequent erosion. As a result the concrete slab has settled, forming a crack in the center of the slab. The fill under the downstream end of the slab has sloughed and eroded, leaving a void under the slab. The condition of the slab will deteriorate further without remedial measures.

The downstream spillway channel is a naturally eroded channel. However, the channel runs parallel to and away from the embankment, therefore eliminating any potential for damage to the embankment.

b. Design and Construction Data

No design or construction data relating to the structural stability of the dam or appurtenant structures were found. No stability and seepage analyses were available for review.

c. Operating Records

No operating records are available relating to the stability of the dam or appurtenant structures. Water levels have not been recorded, however, the reservoir was full on the day of inspection, and is assumed to be close to full at all time.

d. Post Construction Changes

No post construction changes are known to exist which will effect the structural stability of the dam.

e. Seismic Stability

According to the Seismic Zone Map of Contiguous States, Form TM 5-809-10/NAVFAC P-355/AFM 88-3 Chapter 13; April 1973 the portion of Missouri in which Mononame 314 Dam is located is in Seismic Zone 2. This means there is only moderate damage probability. A detailed seismic analysis is not felt to be necessary for this embankment under present conditions. If a stability analysis is to be performed, the seismic coefficient recommended is 0.05.

SECTION 7: ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment

The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

It should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team.

It is also important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that an unsafe condition could be detected.

a. Safety

The spillway capacity of Mononame 314 Dam was found to be "Seriously Inadequate". The spillway/reservoir system will accommodate only 31 percent of the PMF without overtopping the dam.

The dam embankment is in satisfactory structural condition. The wave erosion on the upstream embankment slope is not serious at this time, however, the condition should be monitored and repairs made as required. No signs of distress were observed in the embankment or in the foundation, nor was seepage observed at any location. However, the dam does not have adequate spillway capacity to handle the PMF or even one-half of the PMF without overtopping. According to the hydrologic and hydraulic evaluation of this dam, the dam is overtopped by a maximum depth of about 1 1/2 feet during the PMF. The duration of overflow is over 4 hours. Overtopping could result in dam failure. If the body of the dam is made up of silty soils the probability of failure of the dam due to overtopping will increase.

The cracks on the crest of the embankment are not believed to indicate any unsafe condition, nor is the settlement at the central part of the embankment.

The brush and tree growth on the embankment slope pose a potential hazard to the dam. Tree growth is considered unsatisfactory in terms of dam safety for several reasons: First, trees toppled by wind expose holes that invite rapid erosion, and second, decay of large existing root systems could form channels for eventual piping.

The concrete spillway slab should be repaired prior to further deterioration in its condition. The eroded discharge channel does not jeopardize the safety of the embankment in its present location.

The lack of seepage and stability analyses on record is a deficiency which should be corrected.

b. Adequacy of Information

Adequate information concerning the dam and appurtenant structures is not available. No seepage and stability analyses were available for review.

c. Urgency

The remedial measures recommended in Paragraph 7.2 should be accomplished in the near future.

d. Necessity for Phase II Inspection

Based on results of the Phase I Inspection, and if the remedial measures recommended in Paragraph 7.2 are undertaken as soon as possible, a Phase II Inspection is not felt to be necessary.

7.2 Remedial Measures

a. Alternatives:

Spillway capacity and/or height of dam should be increased to pass the PMF without overtopping the dam.

b. O & M Procedures:

1. Monitor the wave erosion on the upstream embankment slope, and make repairs as required.

2. Repair the concrete spillway slab.

3. Remove trees and large brush from the downstream embankment slope, and prevent future growth.

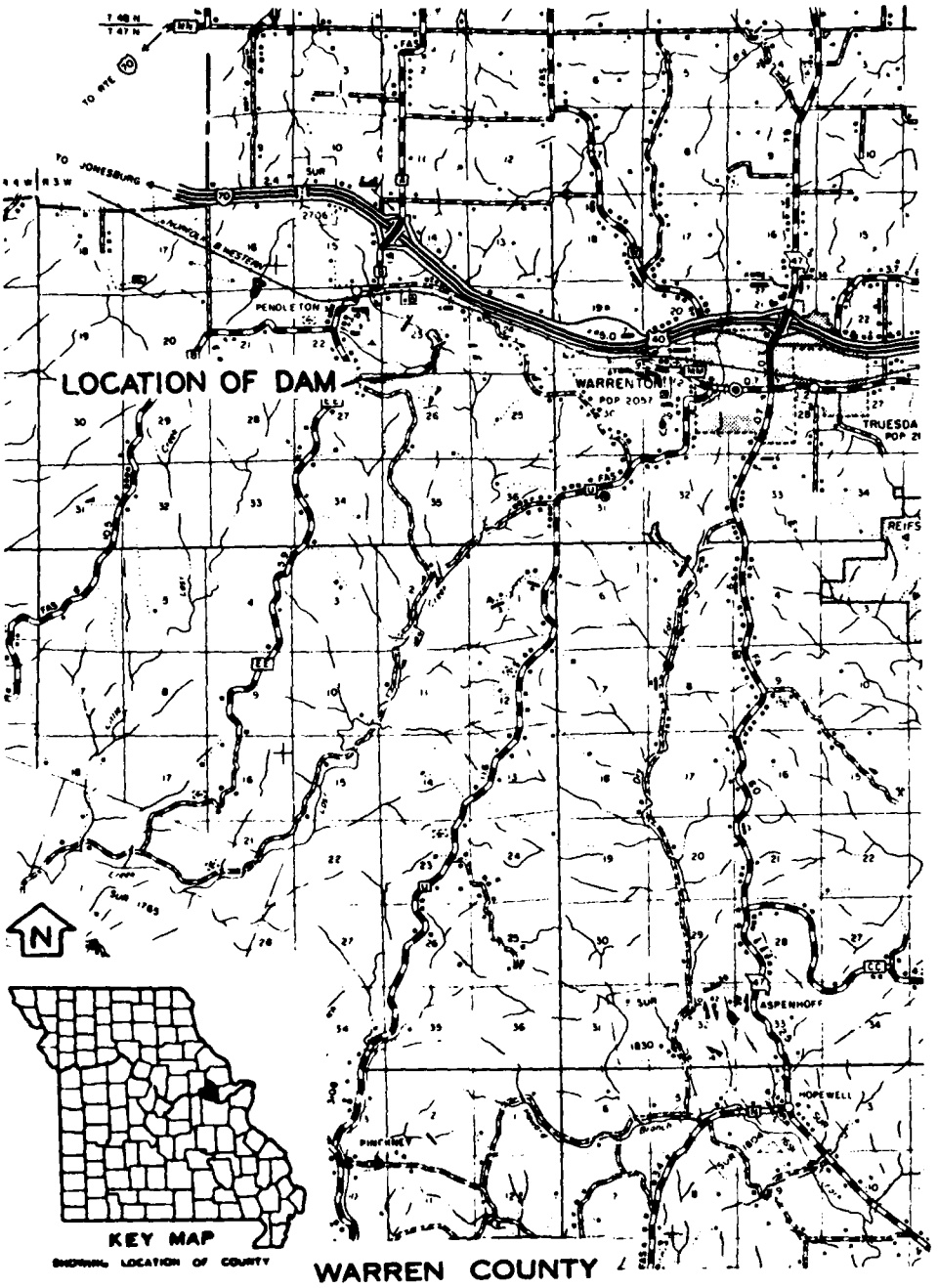
4. Seepage and stability analyses should be performed by a professional engineer experienced in the design and construction of earthen dams.

5. The owner should initiate the following programs.

   (a) Periodic inspection of the dam by a professional engineer experienced in the design and construction of earthen dams.

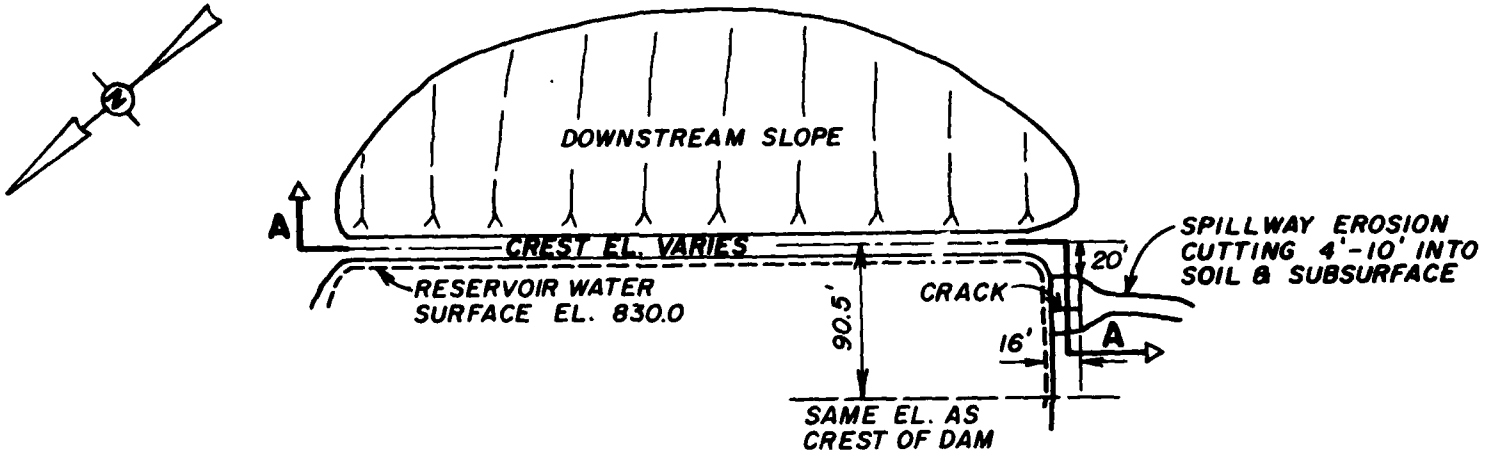
   (b) Set up a maintenance schedule and log all visits to the dam for operation, repairs and maintenance.

PLATES

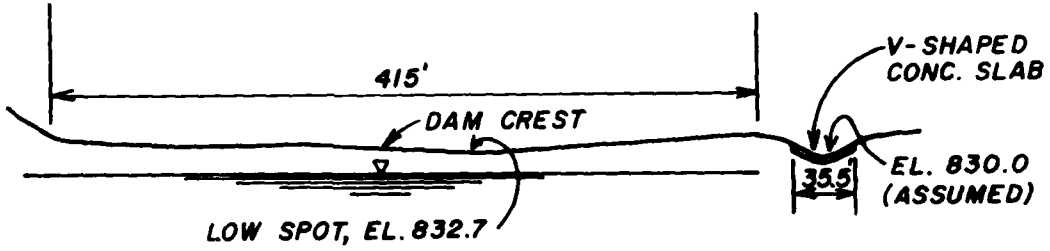


LOCATION MAP - MO. NONAME 314 DAM

MO. NONAME 314 DAM (MO. 30507)
PLAN AND ELEVATION

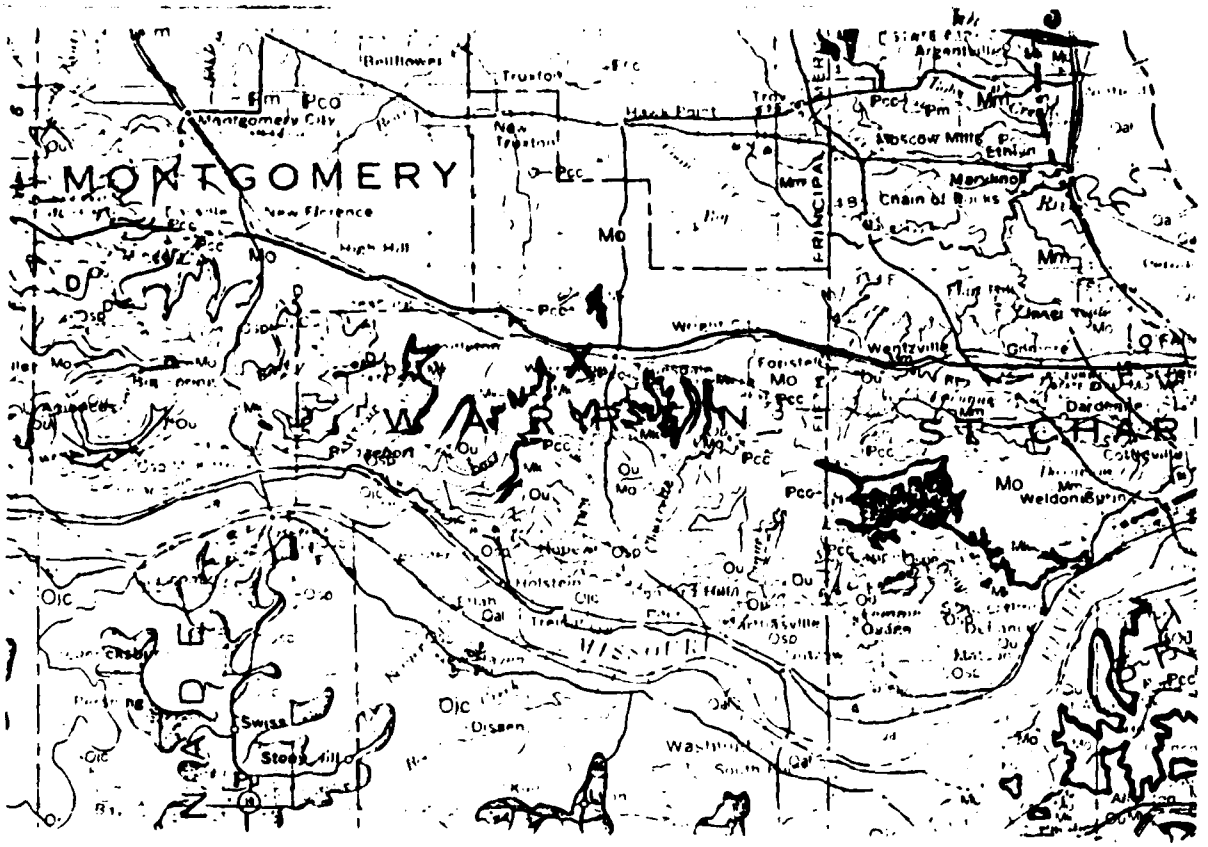


PLAN



ELEVATION (SECTION A-A)

SCALE:
1" = 100' (HORIZONTAL)
VERTICAL (NOT TO SCALE)



QUARTERNARY { Qal - ALLUVIUM

PENNSYLVANIAN {
- Pm - MARMATON GROUP
- Pcc - CHEROKEE GROUP

MISSISSIPPIAN {
- Mm - ST. LOUIS LIMESTONE
  SALEM FORMATION
  WARSAW FORMATION
- Mo - BURLINGTON-KEOKUK FORMATION
- Mk - CHOTEAU GROUP

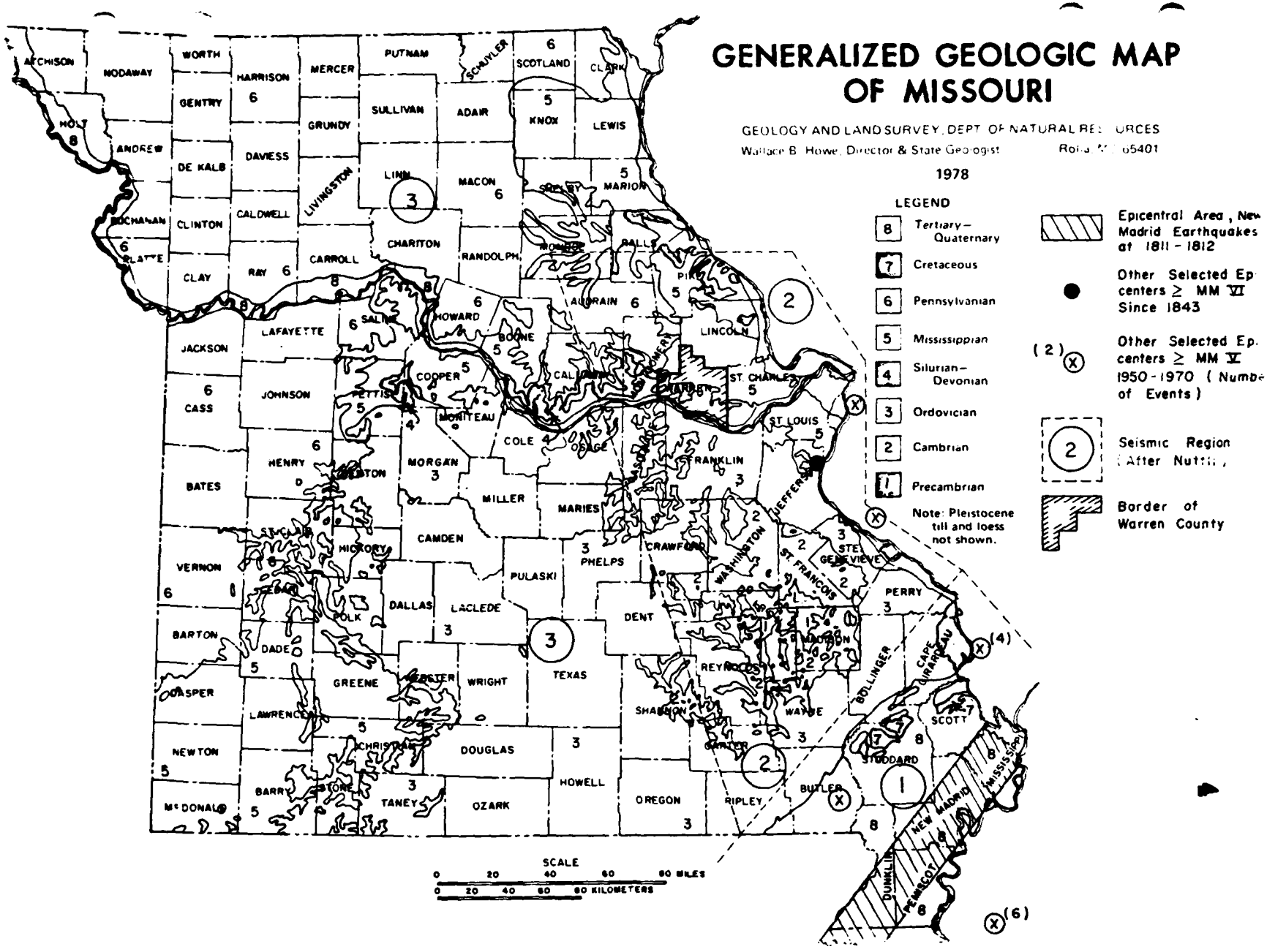
ORDOVICIAN {
- Ou - NOIX LIMESTONE
  MAQUOKETA SHALE
  CAPE LIMESTONE
  KIMMSWICK FORMATION
  DECORAH FORMATION
  PLATTIN FORMATION
  JOACHIM DOLOMITE
- Osp - ST. PETER SANDSTONE
- Ojc - COTTER-POWELL FORMATION
  JEFFERSON CITY DOLOMITE

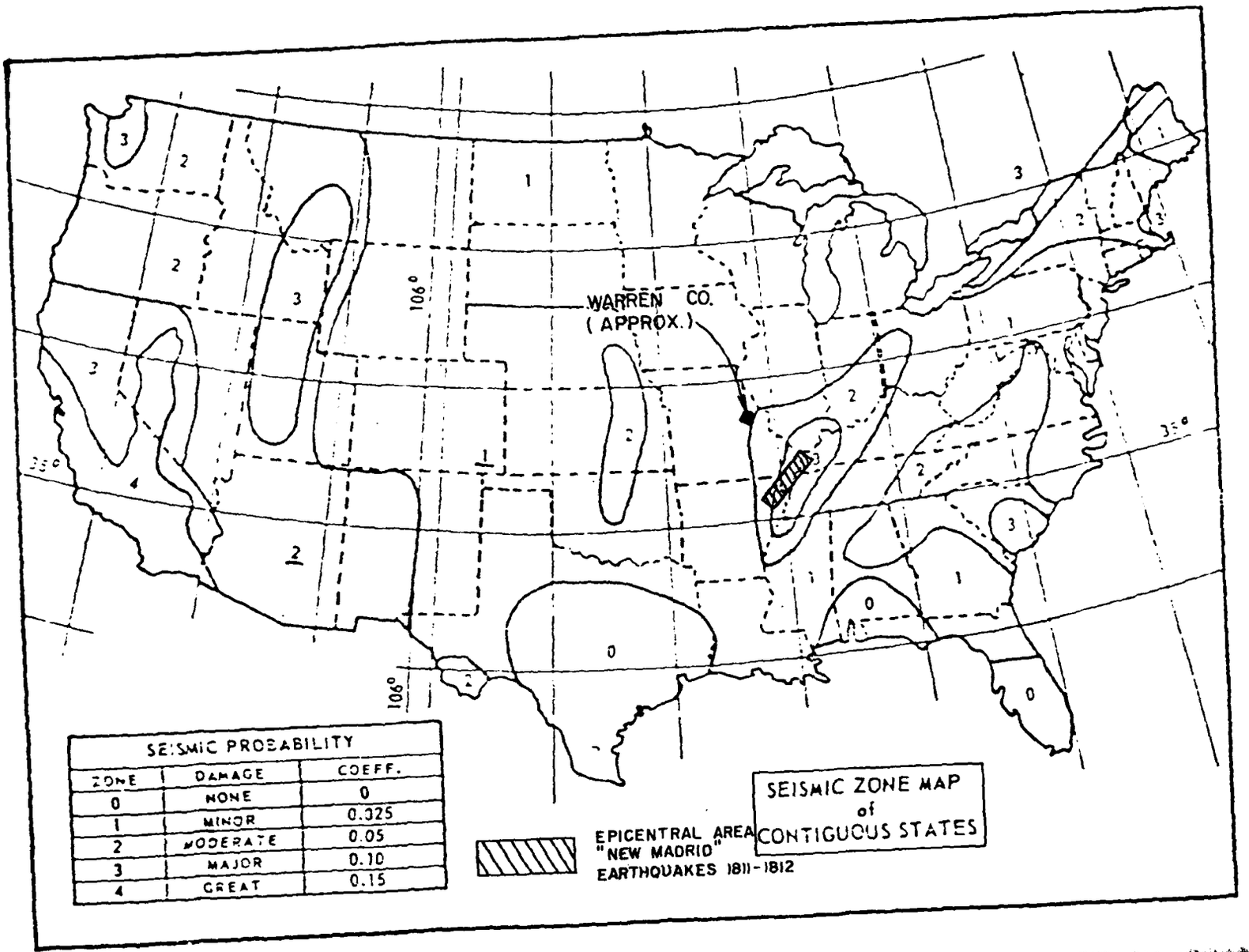
X LOCATION OF DAM MO. 30507

REFERENCE:
GEOLOGIC MAP OF MISSOURI, MISSOURI GEOLOGIC SURVEY, 1979.

10 0 10
SCALE OF MILES

GEOLOGIC MAP OF WARREN COUNTY AND ADJACENT AREA


GENERALIZED GEOLOGIC MAP OF MISSOURI
GEOLOGY AND LAND SURVEY, DEPT. OF NATURAL RESOURCES
Wallace B. Howe, Director & State Geologist
Rolla, Mo. 65401
1978
LEGEND
8 Tertiary–Quaternary
7 Cretaceous
6 Pennsylvanian
5 Mississippian
4 Silurian–Devonian
3 Ordovician
2 Cambrian
1 Precambrian
Note: Pleistocene till and loess not shown.
Epicentral Area, New Madrid Earthquakes at 1811 - 1812
Other Selected Ep centers ≥ MM VI Since 1843
(2) Other Selected Ep. centers ≥ MM V 1950 - 1970 (Numbe of Events)
2 Seismic Region (After Nuttli)
Border of Warren County
SCALE
0 20 40 60 80 MILES
0 20 40 60 80 KILOMETERS
ATCHISON
NODAWAY
WORTH
HARRISON
MERCER
PUTNAM
SCHUYLER
SCOTLAND
CLARK
HOLT
GENTRY
GRUNDY
SULLIVAN
ADAIR
KNOX
LEWIS
ANDREW
DE KALB
DAVIESS
LIVINGSTON
LINN
MACON
SHELBY
MARION
BUCHANAN
CLINTON
CALDWELL
CHARITON
RANDOLPH
MONROE
PIKE
PLATTE
CLAY
RAY
CARROLL
AUDRAIN
LINCOLN
JACKSON
LAFAYETTE
SALINE
HOWARD
BOONE
COOPER
CALLAWAY
WARREN
ST. CHARLES
CASS
JOHNSON
PETTIS
MONITEAU
COLE
OSAGE
FRANKLIN
ST. LOUIS
HENRY
BATES
MORGAN
MILLER
MARIES
JEFFERSON
ST. CLAIR
HICKORY
CAMDEN
CRAWFORD
WASHINGTON
STE. GENEVIEVE
VERNON
PULASKI
PHELPS
ST. FRANCOIS
PERRY
CEDAR
POLK
DALLAS
LACLEDE
DENT
BARTON
DADE
GREENE
WEBSTER
WRIGHT
TEXAS
REYNOLDS
IRON
MADISON
BOLLINGER
CAPE GIRARDEAU
(4)
CASPER
LAWRENCE
SHANNON
WAYNE
SCOTT
NEWTON
CHRISTIAN
DOUGLAS
CARTER
STODDARD
MISSISSIPPI
BARRY
STONE
TANEY
OZARK
HOWELL
OREGON
RIPLEY
BUTLER
NEW MADRID
McDONALD
DUNKLIN
PEMISCOT
(6)


WARREN CO.
(APPROX.)
106°
35°
SEISMIC PROBABILITY
ZONE | DAMAGE | COEFF.
0 | NONE | 0
1 | MINOR | 0.025
2 | MODERATE | 0.05
3 | MAJOR | 0.10
4 | GREAT | 0.15
EPICENTRAL AREA "NEW MADRID" EARTHQUAKES 1811-1812
SEISMIC ZONE MAP of CONTIGUOUS STATES

APPENDIX A

PHOTOGRAPHS TAKEN DURING INSPECTION

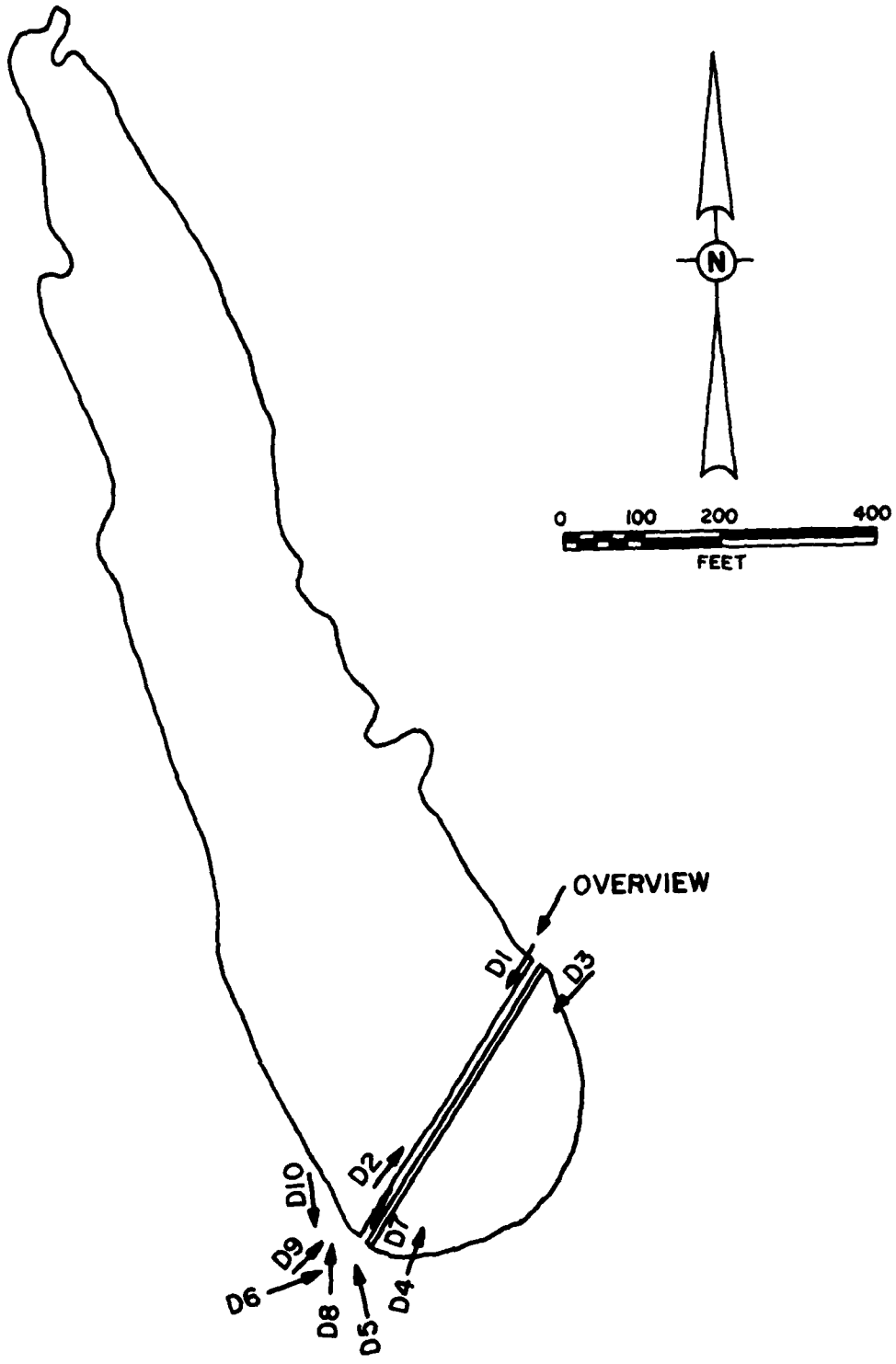


PHOTO INDEX
FOR
MO. NONAME 314 DAM

Mononame 314 Dam

D1 - Upstream embankment slope

D2 - Crest of embankment slope

D3 - Downstream embankment slope

D4 - Downstream embankment slope

D5 - Approach of spillway

D6 - Spillway crest

D7 - Spillway crest

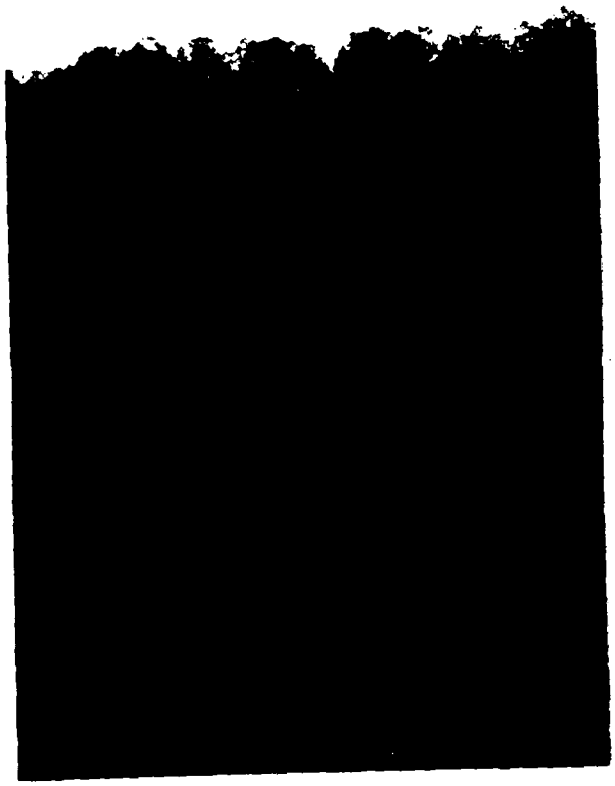
D8 - Concrete spillway pad

D9 - Concrete spillway pad

D10- Spillway discharge channel

Mononame 314 Dam

D1



D2

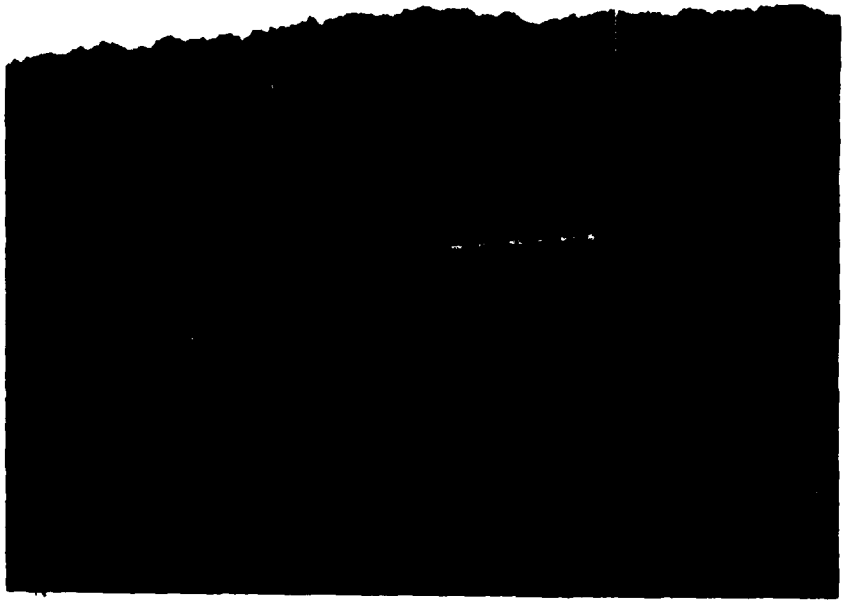
D3

D4

D5

D6

Mononame 314 Dam



D7

D8

Mononame 314 Dam

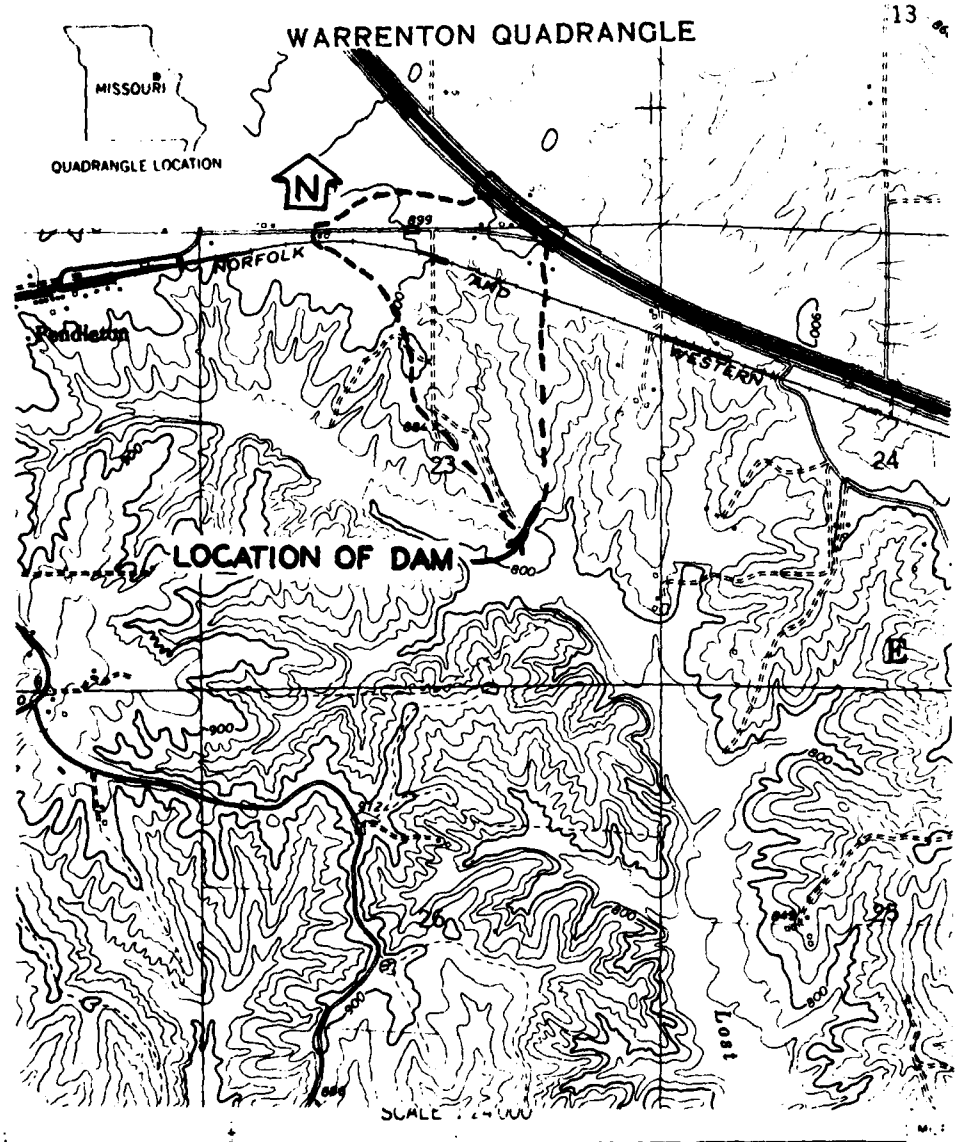
D10

D9

APPENDIX B

HYDROLOGIC COMPUTATIONS

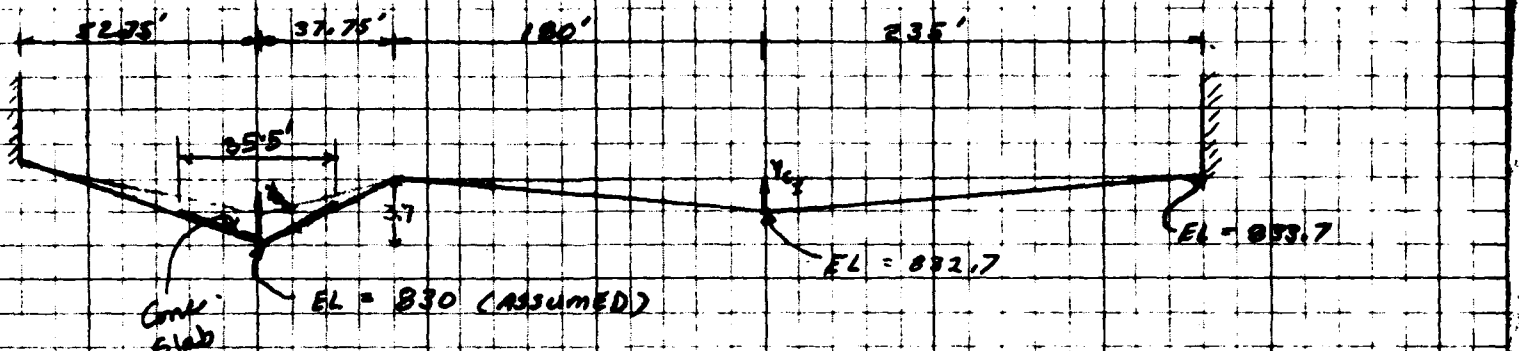
PLATE-1, APPENDIX-B



CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

DRAINAGE BOUNDARY — — — — —

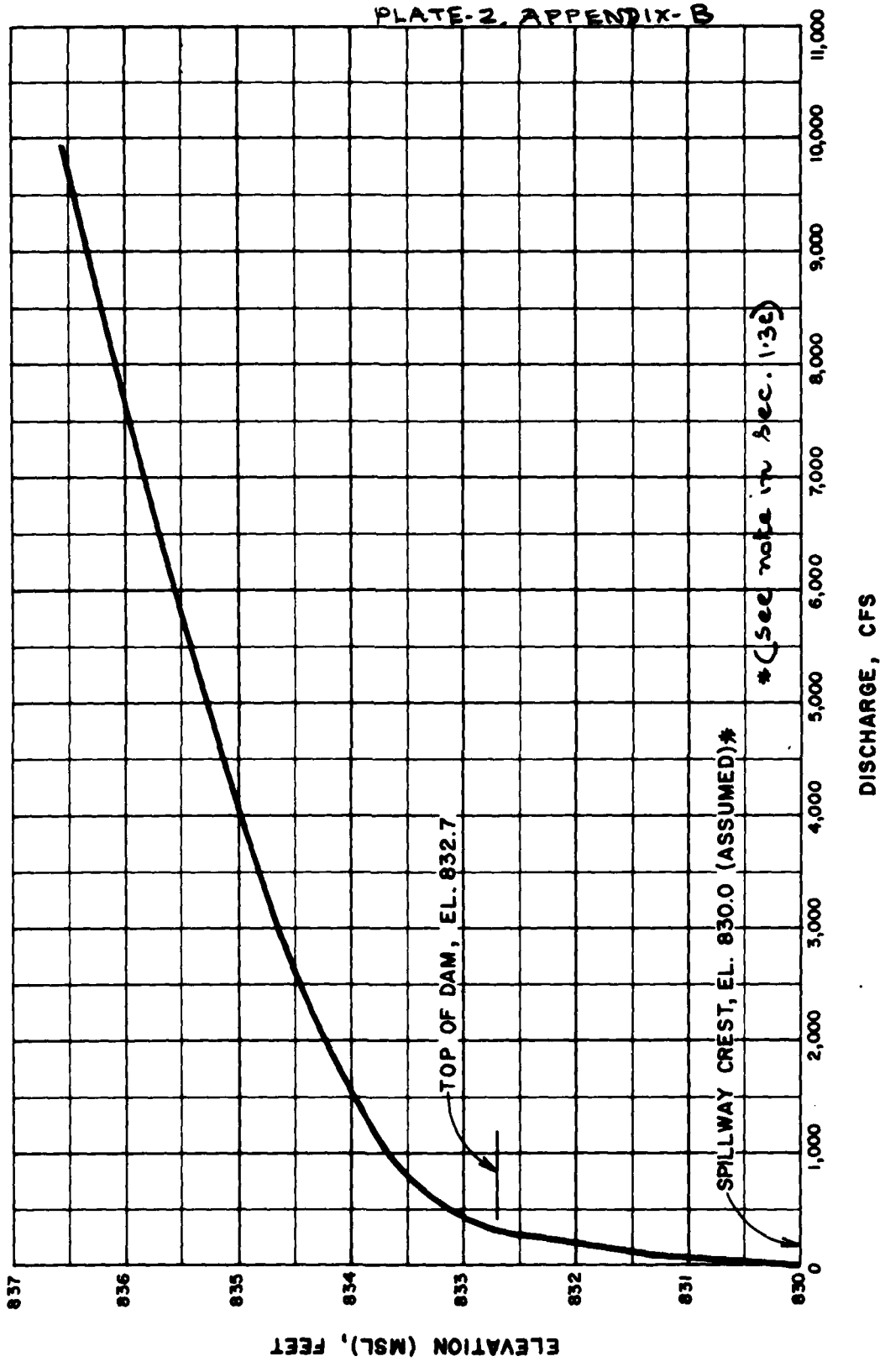
MO. NONAME 314 DAM (MO. 30507) DRAINAGE BASIN



Y_{c_1} (FT)	A_{c_1} (FT²)	T_{c_1} (FT)	$V_1 = 6.67\sqrt{\frac{A_{c_1}}{T_{c_1}}}$	$\frac{V_1^2}{2g}$	$Q_{c_1} = A_{c_1} \cdot V_1$	V_1 w.s. = 830 ft + $\frac{V_1^2}{2g}$	Y_{c_2} = $\frac{2}{3}$ (V w.s. − 832)	A_{c_2}	T_{c_2}	V_{c_2}	$Q_{c_2} = A_{c_2} \cdot V_{c_2}$	$Q_T = Q_{c_1} + Q_{c_2}$
0	0	0	0	0	0	830	0	—	—	—	—	0
1.0	12.23	24.96	4.01	0.25	49.03	831.25	-	-	-	-	-	49.
2.0	48.92	48.92	5.67	0.5	277.38	832.50	-	-	-	-	-	277.
3.0	110.07	73.38	6.94	.75	764.35	833.75	.70	101.68	290.5	3.35	341.1	1105
3.7	167.43	90.50	7.71	.92	1291.25	834.62	1.28	323.7	415	5.01	1620.9	2912
4.5	239.8	90.50	9.23	1.32	2213.4	835.82	2.08	665.7	415	7.13	4744.5	6958
5.0	285.08	90.50	10.06	1.57	2868.26	836.57	2.58	863.2	415	8.18	7058.7	9928

10.5

PLATE-2, APPENDIX-B



MO. NONAME 314 DAM (MO. 30507)
SPILLWAY AND OVERTOP RATING CURVE

ENGINEERING CONSULTANTS, INC.

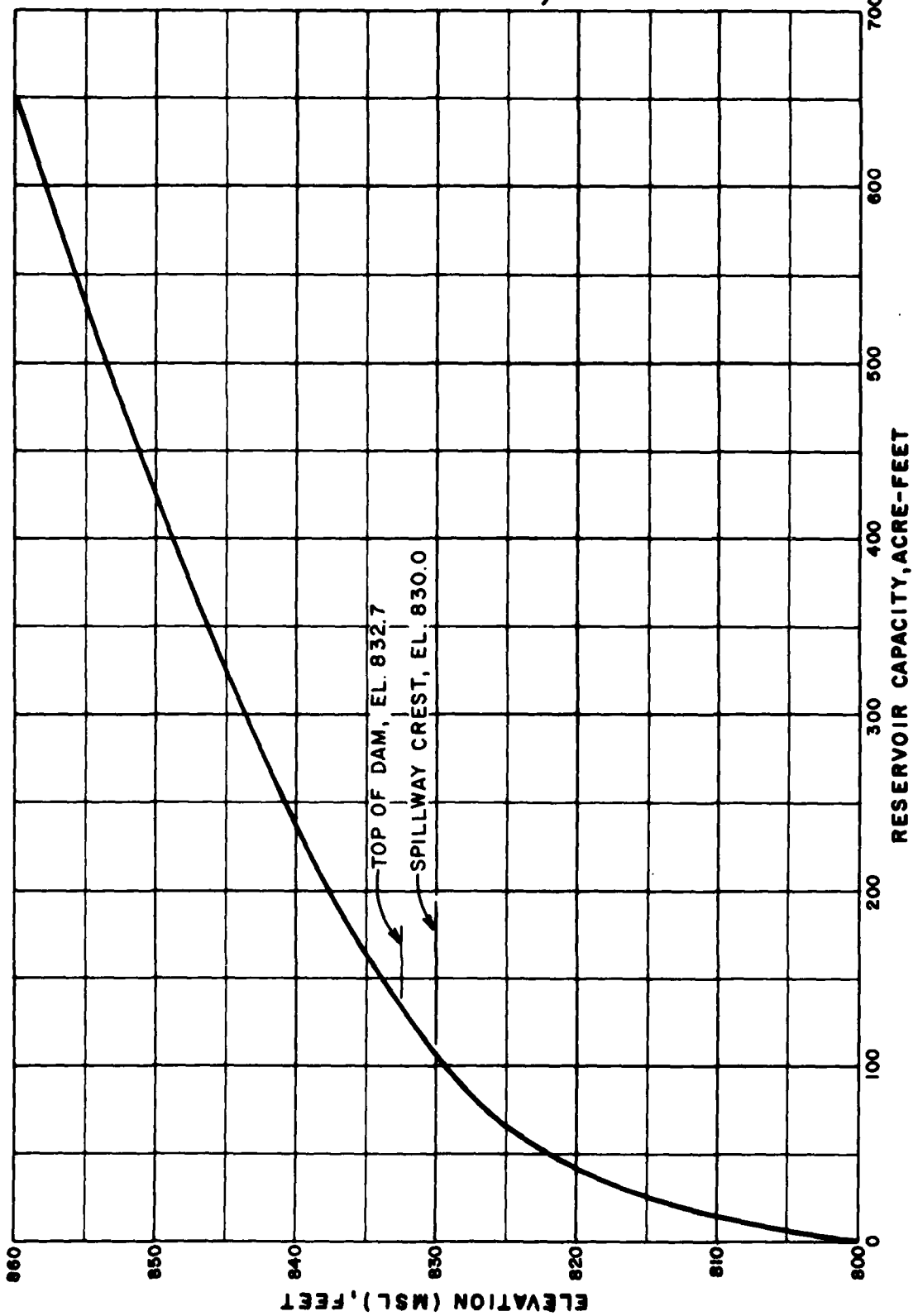
Dam Safety Inspection - Missouri SHEET NO. 1 OF
Menoname #314 - #30507 JOB NO. 1240
Reservoir Area Capacity BY M.R.H. DATE 5-15-79

Menoname #314

Reservoir Area Capacity

Elev. M.S.L. (Ft.)	Reservoir Surface Area (Acres)	Incremental Volume (Ac.-Ft.)	Total Volume (Ac.-Ft.)	Remarks
802	0	—	0	Est. Streambed at Center of Dam
830	11	102.7	102.7	Spillway Crest. (Assumed elev.)
832.7	12.2	31.3	134.0	Top of dam
840	16	102.7	236.7	AREA MEASURED ON U.S.G.S. MAP
860	34	408.8	645.5	AREA MEASURED ON U.S.G.S. MAP.

PLATE-3, APPENDIX-B



MO. NONAME 314 DAM (MO. 30507)
RESERVOIR CAPACITY CURVE

DAM NO MO 30507

DETERMINATION OF PMP

1. Determine drainage area of the basin

   D.A. = 130 ACRES

2. Determine PMP Index Rainfall

   Location of centroid of basin:

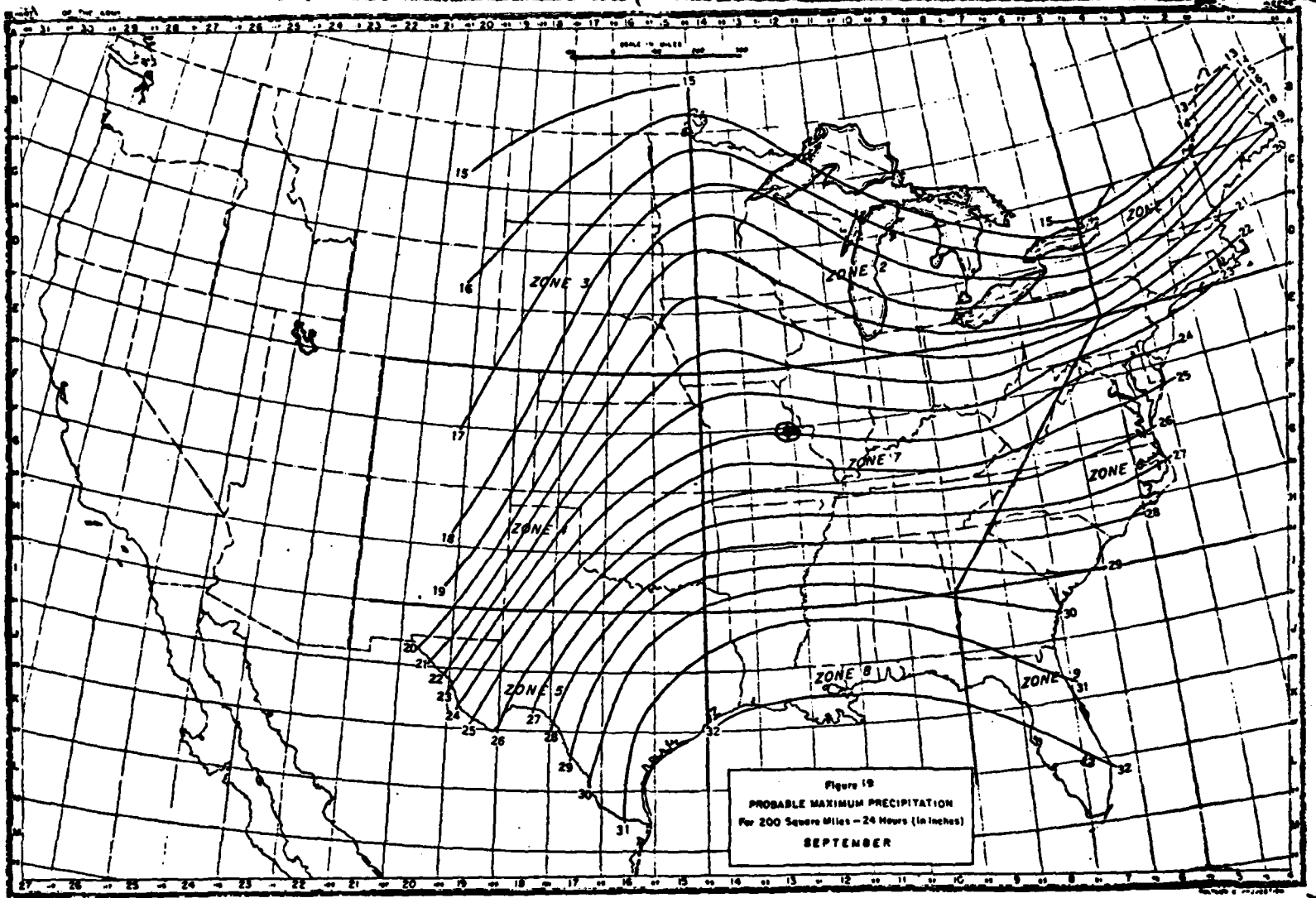
   Long. = 91°12'58", Lat. = 38°49'37". ⇒ PMP = 24" (From Fig 1, HMR #23)

3. Determine basin rainfall in terms of percentage of PMP Index Rainfall for various durations;

   Location: Long. = 91°12'58", Lat. = 38°49'37".

   ⇒ Zone 7.

Duration (Hrs.)	Percent of Index Rainfall (%)	Total Rainfall (inches)	Rainfall Increments (inches)	Duration of Increment (Hrs.)
6	100	24	24	6
12	120	28.8	4.8	6
24	130	31.2	2.4	12



PMP FOR 200 SQ. MI. - 24 HOURS
DURATION = 24"

MO NONAME 314 DAM (MO. 30507)
LOCATION OF CENTROID OF WATERSHED
LAT. = 38°49'37", LONG. = 91°12'58"

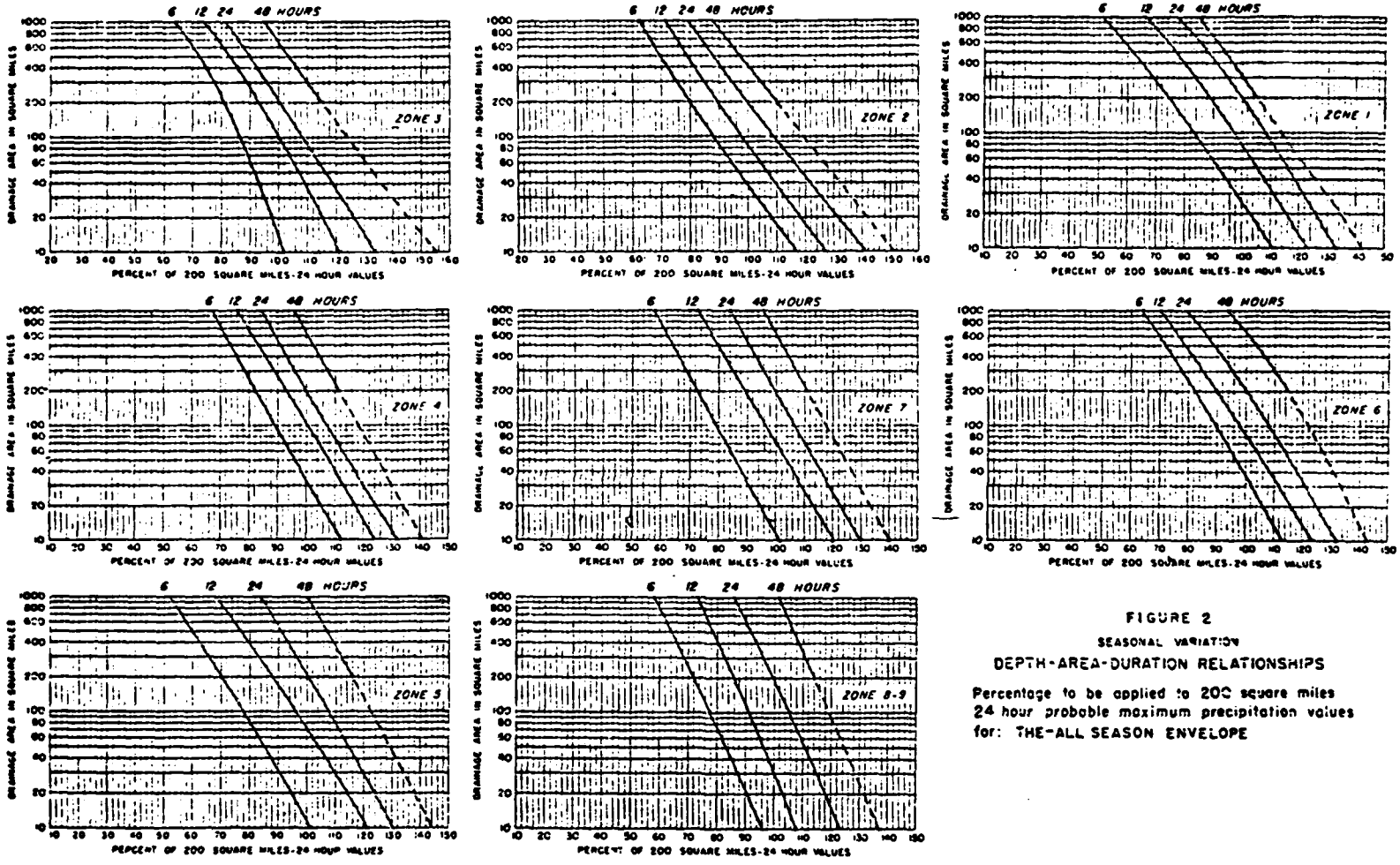


FIGURE 2

SEASONAL VARIATION

DEPTH-AREA-DURATION RELATIONSHIPS

Percentage to be applied to 200 square miles 24 hour probable maximum precipitation values for: THE-ALL SEASON ENVELOPE

ECI-4 ENGINEERING CONSULTANTS, INC.

DAM SAFETY INSPECTION – MISSOURI — SHEET NO. 1 OF
Mo. No NAME # 30507 — JOB NO. 1240-001-1
UNIT HYDROGRAPH PARAMETERS. — BY KLB DATE 5-29-

1. DRAINAGE AREA, A = 130 Ac. = 0.20 SQ. MI.
2. LENGTH OF STREAM = (1.61" x 2000' = 3220") = 0.61 MI.
3. ELEVATION AT DRAINAGE DIVIDE ALONG THE LONGEST STREAM, H_1 = 900'
4. RESERVOIR ELEVATION AT SPILLWAY CREST, H_2 = 830'
5. DIFFERENCE IN ELEVATION, $\Delta H = 900 - 830 = 70$
6. AVERAGE SLOPE OF STREAM = $\frac{\Delta H}{L} = \frac{70}{3220} = 2.2\%$
7. TIME OF CONCENTRATION:
   a) BY KIRPICH FORMULA.
   $$T_c = \left(\frac{11.9 \times L^3}{\Delta H}\right)^{0.385} = \left(\frac{11.9 \times 0.61^3}{70}\right)^{0.385} = 0.29 \text{ HR}$$
   b) By VELOCITY ESTIMATE
   SLOPE = 2.2% ⇒ VELOCITY = 3 FPS,
   $$\therefore T_c = \frac{0.61 \times 5280}{3 \times 60 \times 60} = 0.30 \text{ HR}$$
   USE T_c = 0.30 HR.
8. LAG TIME, $L_t = 0.6 \times 0.30 = 0.18$ HR
9. UNIT DURATION $D \leq \frac{L_t}{3} = \frac{0.18}{3} = 0.06 < 0.083$ HR
   USE D = 0.083 HR = 5 MIN.
10. Time TO PEAK, $T_p = \frac{D}{2} + L_t = \frac{0.083}{2} + 0.18 = 0.22$ HR
11. PEAK $q_p = \frac{484 \times A}{T_p} = \frac{484 \times (0.20)}{0.22} = \underline{440 \text{ CFS}}$

MISSOURI DAM # MO. 30507

DETERMINATION OF HYDROLOGIC SOIL GROUP & SCS CURVE NUMBER

1. The Soils in the watershed consist of B, C & D group Soils. The prominent Soil group is C.

   Assume Soil group 'C' for the entire watershed

2. Most of the watershed is covered with trees and vegetation. Assume 'Fair' condition for infiltration purpose.

   Thus CN = 73 for Soil group C & AMC-II

   $\Rightarrow$ CN = 87 for AMC-III

HEC1DB INPUT DATA

```
*************************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION        JULY 1978
LAST MODIFICATION   26 FEB 79
*************************************

 1  A        DAM SAFETY INSPECTION - MISSOURI
 2  A          MO. NO NAME 314 DAM (30507)
 3  A     PMF AND 50 PERCENT PMF DETERMINATION AND ROUTING
 4  B   300     0     5     0     0     0     0     0     0     0
 5  B1    5
 6  J     1     2     1
 7  J1  1.0   0.5
 8  K     0 30507                                   1
 9  K1  INPUT PRECIPITATION INDEX, RATIOS, AND UNIT HYDROGRAPH PARAMETERS
10  M     1     2  0.20        0.20   1.0
11  P        24.0   100   120   130
12  T                                               -1   -87.0
13  W2       0.18
14  X     0     0     1
15  K     1 30507                       2           1
16  K1  ROUTE HYDROGRAPH THROUGH MO. NO NAME 314 DAM (30507)
17  Y                       1     1
18  Y1    1                                      -830.0     -1
19  Y4 830.0 831.25 832.50 832.70 833.75 834.62 835.82 836.57
20  Y5    0.    49.   277.   315.  1105.  2912.  6958.  9928.
21  $S   0.0  102.7  134.0  236.7  645.5
22  $E  802.   830.  832.7   840.   860.
23  $$  830.
24  $D 832.7
25  K    99
```

INFLOW PMF AND ONE-HALF PMF HYDROGRAPHS

FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79

RUN DATE= 79/06/13.
TIME= 08.18.40.

DAM SAFETY INSPECTION - MISSOURI
NO. NO NAME 314 DAM (30507)
PMF AND 50 PERCENT PMF DETERMINATION AND ROUTING

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	5	0	0	0	0	0	0	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 2 LRTIO= 1

RTIOS= 1.00 .50

SUB-AREA RUNOFF COMPUTATION

INPUT PRECIPITATION INDEX, RATIOS, AND UNIT HYDROGRAPH PARAMETERS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
30507	0	0	0	0	0	1	0	

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISAME	LOCAL
1	2	.20	0.00	.20	1.00	0.00	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	24.00	100.00	120.00	130.00	0.00	0.00	0.00

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	-1.00	-87.00	0.00	0.00

CURVE NO = -87.00 WETNESS = -1.00 EFFECT CN = 87.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .18

RECESSION DATA
STRTQ= 0.00 QRCSN= 0.00 RTIOR= 1.00

UNIT HYDROGRAPH 13 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .18 VOL= 1.00

122.	392.	423.	299.	149.	83.	48.	28.	15.	7.
3.	0.	0.							

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.01	0.00	.01	0.
1.01	.10	2	.01	0.00	.01	0.
1.01	.15	3	.01	0.00	.01	0.
1.01	.20	4	.01	0.00	.01	0.
1.01	.25	5	.01	0.00	.01	0.
1.01	.30	6	.01	0.00	.01	0.
1.01	.35	7	.01	0.00	.01	0.
1.01	.40	8	.01	0.00	.01	0.
1.01	.45	9	.01	0.00	.01	0.
1.01	.50	10	.01	0.00	.01	0.
1.01	.55	11	.01	0.00	.01	0.
1.01	1.00	12	.01	0.00	.01	0.
1.01	1.05	13	.01	0.00	.01	0.
1.01	1.10	14	.01	0.00	.01	0.
1.01	1.15	15	.01	0.00	.01	0.
1.01	1.20	16	.01	0.00	.01	0.
1.01	1.25	17	.01	0.00	.01	0.
1.01	1.30	18	.01	0.00	.01	0.
1.01	1.35	19	.01	0.00	.01	0.
1.01	1.40	20	.01	0.00	.01	0.
1.01	1.45	21	.01	0.00	.01	0.
1.01	1.50	22	.01	0.00	.01	0.
1.01	1.55	23	.01	.00	.01	0.
1.01	2.00	24	.01	.00	.01	0.
1.01	2.05	25	.01	.00	.01	0.
1.01	2.10	26	.01	.00	.01	0.
1.01	2.15	27	.01	.00	.01	1.
1.01	2.20	28	.01	.00	.01	1.
1.01	2.25	29	.01	.00	.01	1.
1.01	2.30	30	.01	.00	.01	2.
1.01	2.35	31	.01	.00	.01	2.
1.01	2.40	32	.01	.00	.01	2.
1.01	2.45	33	.01	.00	.01	3.
1.01	2.50	34	.01	.00	.01	3.
1.01	2.55	35	.01	.00	.01	3.
1.01	3.00	36	.01	.00	.01	3.
1.01	3.05	37	.01	.00	.01	4.
1.01	3.10	38	.01	.00	.01	4.
1.01	3.15	39	.01	.00	.01	4.
1.01	3.20	40	.01	.00	.01	4.
1.01	3.25	41	.01	.00	.01	5.
1.01	3.30	42	.01	.00	.01	5.
1.01	3.35	43	.01	.00	.01	5.
1.01	3.40	44	.01	.00	.01	5.
1.01	3.45	45	.01	.00	.01	6.
1.01	3.50	46	.01	.00	.01	6.
1.01	3.55	47	.01	.00	.01	6.
1.01	4.00	48	.01	.00	.01	6.
1.01	4.05	49	.01	.00	.01	7.
1.01	4.10	50	.01	.00	.01	7.
1.01	4.15	51	.01	.00	.01	7.
1.01	4.20	52	.01	.00	.01	7.
1.01	4.25	53	.01	.01	.01	7.
1.01	4.30	54	.01	.01	.01	8.
1.01	4.35	55	.01	.01	.01	8.
1.01	4.40	56	.01	.01	.01	8.
1.01	12.35	151	.20	.19	.01	2924
1.01	12.40	152	.20	.19	.01	295.
1.01	12.45	153	.20	.19	.01	297.
1.01	12.50	154	.20	.19	.01	299.
1.01	12.55	155	.20	.19	.01	300.
1.01	13.00	156	.20	.19	.01	300.
1.01	13.05	157	.24	.23	.01	306.
1.01	13.10	158	.24	.23	.01	321.
1.01	13.15	159	.24	.23	.01	338.
1.01	13.20	160	.24	.23	.01	350.
1.01	13.25	161	.24	.24	.00	356.
1.01	13.30	162	.24	.24	.00	360.
1.01	13.35	163	.24	.24	.00	362.
1.01	13.40	164	.24	.24	.00	363.
1.01	13.45	165	.24	.24	.00	364.
1.01	13.50	166	.24	.24	.00	364.
1.01	13.55	167	.24	.24	.00	365.
1.01	14.00	168	.24	.24	.00	365.
1.01	14.05	169	.30	.30	.00	373.
1.01	14.10	170	.30	.30	.00	396.
1.01	14.15	171	.30	.30	.00	421.
1.01	14.20	172	.30	.30	.00	439.
1.01	14.25	173	.30	.30	.00	448.
1.01	14.30	174	.30	.30	.00	453.
1.01	14.35	175	.30	.30	.00	456.
1.01	14.40	176	.30	.30	.00	457.
1.01	14.45	177	.30	.30	.00	458.
1.01	14.50	178	.30	.30	.00	459.
1.01	14.55	179	.30	.30	.00	459.
1.01	15.00	180	.30	.30	.00	460.
1.01	15.05	181	.18	.18	.00	446.
1.01	15.10	182	.36	.36	.00	423.
1.01	15.15	183	.36	.36	.00	443.
1.01	15.20	184	.55	.54	.00	506.
1.01	15.25	185	.64	.63	.00	624.
1.01	15.30	186	1.55	1.54	.01	864.
1.01	15.35	187	2.55	2.54	.01	1433.
1.01	15.40	188	1.00	1.00	.00	2069.
1.01	15.45	189	.64	.64	.00	2158.
1.01	15.50	190	.55	.55	.00	1801.
1.01	15.55	191	.36	.36	.00	1371.
1.01	16.00	192	.36	.36	.00	1055.
1.01	16.05	193	.28	.28	.00	828.
1.01	16.10	194	.28	.28	.00	667.
1.01	16.15	195	.28	.28	.00	565.
1.01	16.20	196	.28	.28	.00	503.
1.01	16.25	197	.28	.28	.00	471.
1.01	16.30	198	.28	.28	.00	452.
1.01	16.35	199	.28	.28	.00	441.
1.01	16.40	200	.28	.28	.00	436.
1.01	16.45	201	.28	.28	.00	434.
1.01	16.50	202	.28	.28	.00	433.
1.01	16.55	203	.28	.28	.00	432.
1.01	17.00	204	.28	.28	.00	432.
1.01	17.05	205	.22	.22	.00	425.
1.01	17.10	206	.22	.22	.00	402.

1.01	4.45	57	.01	.01	.01	8.	1.01	17.15	207	.22	.22	.00	377.
1.01	4.50	58	.01	.01	.01	8.	1.01	17.20	208	.22	.22	.00	359.
1.01	4.55	59	.01	.01	.01	8.	1.01	17.25	209	.22	.22	.00	350.
1.01	5.00	60	.01	.01	.01	9.	1.01	17.30	210	.22	.22	.00	345.
1.01	5.05	61	.01	.01	.01	9.	1.01	17.35	211	.22	.22	.00	343.
1.01	5.10	62	.01	.01	.01	9.	1.01	17.40	212	.22	.22	.00	341.
1.01	5.15	63	.01	.01	.01	9.	1.01	17.45	213	.22	.22	.00	341.
1.01	5.20	64	.01	.01	.01	9.	1.01	17.50	214	.22	.22	.00	340.
1.01	5.25	65	.01	.01	.01	9.	1.01	17.55	215	.22	.22	.00	340.
1.01	5.30	66	.01	.01	.01	10.	1.01	18.00	216	.22	.22	.00	340.
1.01	5.35	67	.01	.01	.01	10.	1.01	18.05	217	.02	.02	.00	315.
1.01	5.40	68	.01	.01	.01	10.	1.01	18.10	218	.02	.02	.00	239.
1.01	5.45	69	.01	.01	.01	10.	1.01	18.15	219	.02	.02	.00	185.
1.01	5.50	70	.01	.01	.01	10.	1.01	18.20	220	.02	.02	.00	96.
1.01	5.55	71	.01	.01	.01	10.	1.01	18.25	221	.02	.02	.00	66.
1.01	6.00	72	.01	.01	.01	10.	1.01	18.30	222	.02	.02	.00	50.
1.01	6.05	73	.07	.04	.03	14.	1.01	18.35	223	.02	.02	.00	41.
1.01	6.10	74	.07	.04	.03	25.	1.01	18.40	224	.02	.02	.00	36.
1.01	6.15	75	.07	.04	.03	38.	1.01	18.45	225	.02	.02	.00	33.
1.01	6.20	76	.07	.04	.03	43.	1.01	18.50	226	.02	.02	.00	32.
1.01	6.25	77	.07	.04	.03	55.	1.01	18.55	227	.02	.02	.00	31.
1.01	6.30	78	.07	.04	.02	59.	1.01	19.00	228	.02	.02	.00	31.
1.01	6.35	79	.07	.04	.02	62.	1.01	19.05	229	.02	.02	.00	31.
1.01	6.40	80	.07	.05	.02	65.	1.01	19.10	230	.02	.02	.00	31.
1.01	6.45	81	.07	.05	.02	67.	1.01	19.15	231	.02	.02	.00	31.
1.01	6.50	82	.07	.05	.02	69.	1.01	19.20	232	.02	.02	.00	31.
1.01	6.55	83	.07	.05	.02	71.	1.01	19.25	233	.02	.02	.00	31.
1.01	7.00	84	.07	.05	.02	73.	1.01	19.30	234	.02	.02	.00	31.
1.01	7.05	85	.07	.05	.02	74.	1.01	19.35	235	.02	.02	.00	31.
1.01	7.10	86	.07	.05	.02	76.	1.01	19.40	236	.02	.02	.00	31.
1.01	7.15	87	.07	.05	.02	77.	1.01	19.45	237	.02	.02	.00	31.
1.01	7.20	88	.07	.05	.01	78.	1.01	19.50	238	.02	.02	.00	31.
1.01	7.25	89	.07	.05	.01	79.	1.01	19.55	239	.02	.02	.00	31.
1.01	7.30	90	.07	.05	.01	80.	1.01	20.00	240	.02	.02	.00	31.
1.01	7.35	91	.07	.05	.01	81.	1.01	20.05	241	.02	.02	.00	31.
1.01	7.40	92	.07	.05	.01	82.	1.01	20.10	242	.02	.02	.00	31.
1.01	7.45	93	.07	.05	.01	83.	1.01	20.15	243	.02	.02	.00	31.
1.01	7.50	94	.07	.06	.01	83.	1.01	20.20	244	.02	.02	.00	31.
1.01	7.55	95	.07	.06	.01	84.	1.01	20.25	245	.02	.02	.00	31.
1.01	8.00	96	.07	.06	.01	85.	1.01	20.30	246	.02	.02	.00	31.
1.01	8.05	97	.07	.06	.01	86.	1.01	20.35	247	.02	.02	.00	31.
1.01	8.10	98	.07	.06	.01	86.	1.01	20.40	248	.02	.02	.00	31.
1.01	8.15	99	.07	.06	.01	87.	1.01	20.45	249	.02	.02	.00	31.
1.01	8.20	100	.07	.06	.01	87.	1.01	20.50	250	.02	.02	.00	31.
1.01	8.25	101	.07	.06	.01	88.	1.01	20.55	251	.02	.02	.00	31.
1.01	8.30	102	.07	.06	.01	88.	1.01	21.00	252	.02	.02	.00	31.
1.01	8.35	103	.07	.06	.01	89.	1.01	21.05	253	.02	.02	.00	31.
1.01	8.40	104	.07	.06	.01	89.	1.01	21.10	254	.02	.02	.00	31.
1.01	8.45	105	.07	.06	.01	90.	1.01	21.15	255	.02	.02	.00	31.
1.01	8.50	106	.07	.06	.01	90.	1.01	21.20	256	.02	.02	.00	31.
1.01	8.55	107	.07	.06	.01	91.	1.01	21.25	257	.02	.02	.00	31.
1.01	9.00	108	.07	.06	.01	91.	1.01	21.30	258	.02	.02	.00	31.
1.01	9.05	109	.07	.06	.01	91.	1.01	21.35	259	.02	.02	.00	31.
1.01	9.10	110	.07	.06	.01	92.	1.01	21.40	260	.02	.02	.00	31.
1.01	9.15	111	.07	.06	.01	92.	1.01	21.45	261	.02	.02	.00	31.
1.01	9.20	112	.07	.06	.01	92.	1.01	21.50	262	.02	.02	.00	31.
1.01	9.25	113	.07	.06	.01	93.	1.01	21.55	263	.02	.02	.00	31.
1.01	9.30	114	.07	.06	.01	93.	1.01	22.00	264	.02	.02	.00	31.
1.01	9.35	115	.07	.06	.01	93.	1.01	22.05	265	.02	.02	.00	31.
1.01	9.40	116	.07	.06	.01	94.	1.01	22.10	266	.02	.02	.00	31.

1.01	9.45	117	.07	.06	.01	94.	1.01	22.15	267	.02	.02	.00	31.
1.01	9.50	118	.07	.06	.01	94.	1.01	22.20	268	.02	.02	.00	31.
1.01	9.55	119	.07	.06	.01	94.	1.01	22.25	269	.02	.02	.00	31.
1.01	10.00	120	.07	.06	.01	95.	1.01	22.30	270	.02	.02	.00	31.
1.01	10.05	121	.07	.06	.01	95.	1.01	22.35	271	.02	.02	.00	31.
1.01	10.10	122	.07	.06	.01	95.	1.01	22.40	272	.02	.02	.00	31.
1.01	10.15	123	.07	.06	.00	95.	1.01	22.45	273	.02	.02	.00	31.
1.01	10.20	124	.07	.06	.00	95.	1.01	22.50	274	.02	.02	.00	31.
1.01	10.25	125	.07	.06	.00	95.	1.01	22.55	275	.02	.02	.00	31.
1.01	10.30	126	.07	.06	.00	96.	1.01	23.00	276	.02	.02	.00	31.
1.01	10.35	127	.07	.06	.00	96.	1.01	23.05	277	.02	.02	.00	31.
1.01	10.40	128	.07	.06	.00	96.	1.01	23.10	278	.02	.02	.00	31.
1.01	10.45	129	.07	.06	.00	96.	1.01	23.15	279	.02	.02	.00	31.
1.01	10.50	130	.07	.06	.00	96.	1.01	23.20	280	.02	.02	.00	31.
1.01	10.55	131	.07	.06	.00	97.	1.01	23.25	281	.02	.02	.00	31.
1.01	11.00	132	.07	.06	.00	97.	1.01	23.30	282	.02	.02	.00	31.
1.01	11.05	133	.07	.06	.00	97.	1.01	23.35	283	.02	.02	.00	31.
1.01	11.10	134	.07	.06	.00	97.	1.01	23.40	284	.02	.02	.00	31.
1.01	11.15	135	.07	.06	.00	97.	1.01	23.45	285	.02	.02	.00	31.
1.01	11.20	136	.07	.06	.00	97.	1.01	23.50	286	.02	.02	.00	31.
1.01	11.25	137	.07	.06	.00	97.	1.01	23.55	287	.02	.02	.00	31.
1.01	11.30	138	.07	.06	.00	97.	1.02	0.00	288	.02	.02	.00	31.
1.01	11.35	139	.07	.06	.00	98.	1.02	.05	289	0.00	0.00	0.00	28.
1.01	11.40	140	.07	.06	.00	98.	1.02	.10	290	0.00	0.00	0.00	21.
1.01	11.45	141	.07	.06	.00	98.	1.02	.15	291	0.00	0.00	0.00	12.
1.01	11.50	142	.07	.06	.00	98.	1.02	.20	292	0.00	0.00	0.00	7.
1.01	11.55	143	.07	.06	.00	98.	1.02	.25	293	0.00	0.00	0.00	4.
1.01	12.00	144	.07	.06	.00	98.	1.02	.30	294	0.00	0.00	0.00	2.
1.01	12.05	145	.20	.19	.01	114.	1.02	.35	295	0.00	0.00	0.00	1.
1.01	12.10	146	.20	.19	.01	163.	1.02	.40	296	0.00	0.00	0.00	1.
1.01	12.15	147	.20	.19	.01	217.	1.02	.45	297	0.00	0.00	0.00	0.
1.01	12.20	148	.20	.19	.01	255.	1.02	.50	298	0.00	0.00	0.00	0.
1.01	12.25	149	.20	.19	.01	274.	1.02	.55	299	0.00	0.00	0.00	0.
1.01	12.30	150	.20	.19	.01	285.	1.02	1.00	300	0.00	0.00	0.00	0.
									SUM	31.20	29.48	1.72	45633.
										(792.)	(749.)	(44.)	(1292.18)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2158.	506.	158.	152.	45629.
CMS	61.	14.	4.	4.	1292.
INCHES		23.55	29.48	29.48	29.48
MM		597.63	748.69	748.69	748.69
AC-FT		251.	314.	314.	314.
THOUS CU M		309.	388.	388.	388.

HYDROGRAPH AT STA 30507 FOR PLAN 1, RTIO 1

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	1.	1.	1.	2.
2.	2.	3.	3.	3.	3.	4.	4.	4.	4.
5.	5.	5.	5.	6.	6.	6.	6.	7.	7.
7.	7.	7.	8.	8.	8.	8.	8.	8.	9.
9.	9.	9.	9.	9.	10.	10.	10.	10.	10.
10.	10.	14.	25.	38.	48.	55.	59.	62.	65.
67.	69.	71.	73.	74.	76.	77.	78.	79.	80.
81.	82.	83.	83.	84.	85.	86.	86.	87.	87.
88.	88.	89.	89.	90.	90.	91.	91.	91.	92.

92.	92.	93.	93.	93.	94.	94.	94.	94.	95.
95.	95.	95.	95.	96.	96.	96.	96.	96.	96.
97.	97.	97.	97.	97.	97.	97.	97.	98.	98.
96.	96.	98.	98.	114.	163.	217.	255.	274.	285.
293.	295.	297.	299.	300.	300.	306.	321.	338.	350.
356.	360.	362.	363.	364.	364.	365.	365.	373.	396.
421.	439.	448.	455.	456.	457.	458.	459.	459.	460.
446.	423.	443.	504.	624.	864.	1433.	2069.	2158.	1801.
1371.	1056.	828.	667.	565.	503.	471.	452.	441.	436.
434.	433.	432.	432.	429.	402.	377.	359.	350.	345.
343.	341.	341.	340.	340.	340.	315.	239.	155.	96.
66.	50.	41.	36.	34.	32.	31.	31.	31.	31.
31.	31.	31.	31.	31.	31.	31.	31.	31.	31.
31.	31.	31.	31.	31.	31.	31.	31.	31.	32.
31.	31.	31.	31.	31.	31.	31.	31.	31.	31.
31.	31.	31.	31.	31.	31.	31.	31.	31.	31.
31.	31.	31.	31.	31.	31.	31.	31.	31.	31.
31.	31.	31.	31.	31.	31.	31.	31.	28.	21.
12.	7.	4.	2.	1.	1.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2158.	508.	159.	152.	45629.
CMS	61.	14.	4.	4.	1292.
INCHES	---	23.53	29.48	29.48	29.48
MM	---	597.63	748.69	748.69	748.69
AC-FT		291.	314.	314.	314.
THOUS CU M		359.	386.	388.	388.

HYDROGRAPH AT STA 30307 FOR PLAN 1, PTIO 2

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
1.	1.	1.	1.	2.	2.	2.	2.	2.	2.
2.	2.	3.	3.	3.	3.	3.	3.	3.	3.
3.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	7.	13.	19.	24.	27.	30.	31.	33.
34.	35.	36.	36.	37.	38.	38.	39.	39.	40.
40.	41.	41.	42.	42.	42.	43.	43.	43.	44.
44.	44.	44.	45.	45.	45.	45.	46.	46.	46.
46.	46.	46.	47.	47.	47.	47.	47.	47.	47.
47.	47.	48.	48.	48.	48.	48.	48.	48.	48.
48.	48.	48.	48.	49.	49.	49.	49.	49.	49.
49.	49.	49.	49.	57.	81.	103.	127.	137.	145.
146.	148.	149.	149.	150.	150.	153.	161.	169.	175.
178.	180.	181.	182.	182.	182.	182.	183.	186.	191.
210.	219.	224.	226.	228.	229.	229.	229.	230.	230.
228.	212.	222.	254.	312.	432.	717.	1035.	1079.	901.
645.	528.	414.	334.	282.	252.	235.	226.	221.	218.
217.	216.	216.	216.	212.	201.	188.	180.	175.	173.
171.	171.	170.	170.	170.	170.	158.	120.	77.	44.
33.	25.	20.	18.	17.	16.	16.	15.	15.	15.
15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
15.	15.	15.	15.	15.	15.	15.	15.	14.	15.

6.	5.	2.	1.	1.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1079.	283.	79.	7[illegible]	22R14.
CMS	31.	7.	2.	2.	646.
INCHES		11.74	14.74	14.74	14.74
MM		298.81	374.34	374.34	374.34
AC-FT		125.	157.	157.	157.
THOUS CU M		155.	194.	194.	194.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE HYDROGRAPH THROUGH PO. NO NAME SIN DAM (30507)

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
30507	1	0	0	2	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-R36.	-1

STAGE	830.00	831.25	832.50	832.70	833.75	834.62	835.82	836.57
FLOW	0.00	99.00	277.00	315.00	1105.00	2932.00	6958.00	9998.00
CAPACITY=	0.	103.	134.	237.	546.			
ELEVATION=	802.	830.	835.	840.	860.			

CRFL	SPWID	COON	EXPW	ELEVL	COOL	CAREA	EXPL
830.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COCO	EXPD	DAMWID
832.7	0.0	0.0	0.

STATION 30507, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	2.	2.	2.
2.	2.	2.	2.	2.	2.	3.	3.	3.	3.
3.	3.	3.	4.	4.	4.	4.	4.	4.	4.
4.	5.	5.	5.	6.	7.	8.	9.	10.	11.
12.	14.	15.	16.	18.	19.	20.	22.	23.	24.
26.	27.	28.	29.	31.	32.	33.	34.	35.	37.
38.	39.	40.	41.	42.	43.	45.	46.	47.	48.

SUMMARY OF PMF AND ONE-HALF PMF FLOOD ROUTING

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO APPLIED TO FLOWS	
				RATIO 1 1.00	RATIO 2 .50
HYDROGRAPH AT	30507	.20 (.52)	1	2159. (61.11)	1079. (30.55)
ROUTED TO	30507	.20 (.52)	1	1494. (53.65)	734. (20.81)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	830.00	830.00	832.70
STORAGE	10[illegible].	103.	134.
OUTFLOW	0.	0.	315.

RATIO OF PMF	MAXIMUM RESERVOIR WS ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	834.13	1.43	154.	1894.	4.25	15.83	0.00
.53	833.20	.50	142.	735.	.92	15.92	0.00

PERCENT OF PMF FLOOD ROUTING
EQUAL TO SPILLWAY CAPACITY

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********************************

RUN  DATE= 79/06/14.
     TIME= 10.00.14.
```

DAM SAFETY INSPECTION - MISSOURI
MO. NO NAME 314 DAM (30507)
PERCENT OF PMF DETERMINATION AND ROUTING

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	5	0	0	0	2	0	4	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1

RTIOS= .30 .31 .32 .33 .34 .35 .36 .37 .38

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INPUT PRECIPITATION INDEX, RATIOS, AND UNIT HYDROGRAPH PARAMETERS

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
30507	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	2	.20	0.00	.20	1.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	24.00	100.00	120.00	130.00	0.00	0.00	0.00

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	-1.00	-87.00	0.00	0.00

CURVE NO = *87.00 WETNESS = -1.00 EFFECT CN = 87.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .18

RECESSION DATA
STRTQ= 0.00 QRCSN= 0.00 RTIOR= 1.00

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q

SUM 31.20 29.48 1.72 45833.
(792.1)(749.1(44.1(1298.18)

HYDROGRAPH ROUTING

ROUTE HYDROGRAPH THROUGH NO. 40 NAME *IN DAM (30507)

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
30507	1	0	0	0	0	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-830.	-1

STAGE	830.00	831.25	832.50	832.70	833.75	834.62	835.82	836.57
FLOW	0.00	49.00	277.00	315.00	1105.00	2912.00	6958.00	9928.00
CAPACITY=	0.	133.	134.	237.	646.			
ELEVATION=	802.	830.	833.	340.	860.			

CREL	SPWID	COOL	EXPW	ELEVL	COOL	CAREA	EXPL
830.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
832.7	0.0	0.0	0.

PEAK OUTFLOW IS 305. AT TIME 16.00 HOURS

PEAK OUTFLOW IS 318. AT TIME 16.00 HOURS

PEAK OUTFLOW IS 347. AT TIME 16.00 HOURS

PEAK OUTFLOW IS 372. AT TIME 16.00 HOURS

PEAK OUTFLOW IS 396. AT TIME 16.00 HOURS

PEAK OUTFLOW IS 417. AT TIME 16.00 HOURS

PEAK OUTFLOW IS 438. AT TIME 15.92 HOURS

PEAK OUTFLOW IS 402. AT TIME 15.92 HOURS

PEAK OUTFLOW IS 487. AT TIME 15.92 HOURS

....

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ..... INITIAL VALUE SPILLWAY CREST TOP OF DAM

ELEVATION	830.00	830.00	832.70
STORAGE	105.	103.	134.
OUTFLOW	0.	0.	315.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.30	832.69	0.00	133.	305.	0.00	16.00	0.00
.31	832.70	.00	134.	318.	.08	16.00	0.00
.32	832.74	.04	134.	347.	.25	16.00	0.00
.33	832.78	.09	135.	372.	.33	16.00	0.00
.34	832.81	.11	136.	396.	.42	16.00	0.00
.35	832.84	.14	136.	417.	.42	16.00	0.00
.36	832.86	.16	136.	438.	.50	15.92	0.00
.37	832.90	.20	137.	462.	.50	15.92	0.00
.38	832.93	.23	137.	487.	.50	15.92	0.00

PEAK FLO AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS								
				RATIO 1 .30	RATIO 2 .31	RATIO 3 .32	RATIO 4 .33	RATIO 5 .34	RATIO 6 .35	RATIO 7 .36	RATIO 8 .37	RATIO 9 .38
HYDROGRAPH AT	10507	.20 (.52)	1	647. (18.33)	669. (18.94)	691. (19.55)	712. (20.17)	734. (20.78)	755. (21.39)	777. (22.00)	798. (22.61)	820. (23.22)
ROUTE TO	10553	.20 (.52)	1	305. (8.64)	318. (9.01)	347. (9.82)	371. (10.50)	396. (11.21)	417. (11.80)	436. (12.34)	462. (13.08)	487. (13.79)


DATE:
TIME